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Bengal Ophthalmic Journal

November 2016

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Journal Committee:
Paromita Sanatani
Bikash Bhattacharya
Santanu Mandal
Anirban Bhaduri
Soumen Mondal
Hail a bright future...

We deem this to be a strongly positive move to create the “Editor Journal” post in the Executive Committee of the Ophthalmological Society of West Bengal, which was never before thought of in the past. In the previous years the editor of the journal was usually selected from the elected members of the Executive Committee to take care of the journal. The process of selection was usually based upon goodwill and academic performances of the concerned member. This is definitely a positive approach, but not a definitive approach. The present procedure of creating a post for “Editor Journal” in the electoral process will create that definitive approach where the candidate applying for the post will have the target and the job definition fixed even before he or she is elected for the post. The competitive nature of the electoral process will further sharpen his or her objectives, goals and to-do list for the journal for the next two academic years. Thus we hail and visualize a very bright and ‘happening’ future for our Bengal Ophthalmic Journal in the ensuing years.

We also do request for an hour long “Bengal Ophthalmic Journal Session” in our annual conferences every year. This one hour of academic session will be under the discretion of the editor of the journal. This session will be dedicated to train the young academic minds on how to write an article, how to publish in various journals globally, and furthermore how to do an academic research in a scientific process. This will create a direct interaction between our members and the functioning editorial board of the journal. This will further encourage the submission of original articles for the journal.

The third step will be to publish at least two issues in every academic year. The first issue will be in November during the annual conference. The second issue will be in May during the Mid-term conference. This will encourage the continuity of the journal and the relevance of the journal amongst our members.

The fourth step will be to publish the first two awarded papers from each category in the journal instead of only the first one as is the current practice now. As for example, the first two papers from Dr B K Mitra Award Session will be considered for publication in the journal. The first one will be published in the annual conference, the second one will be published in the Mid-term conference. This can be for all the categories presently in vogue today.

The fifth and the final suggestion will be to consider the first two papers in Dr. P. K. Chattarjee Free Paper Competition for publication in our journal. This will encourage the post-graduates and the fellows to write and publish in a scientific pattern.

Hail a bright future for the Bengal Ophthalmic Journal!

Debashis Das
Editor, Bengal Ophthalmic Journal.
e-mail: debashisdas@hotmail.com
In Chronic Dry Eyes, PRK, LASIK & CVS

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- No blurring of vision

**Longer Retention & Excellent Comfort**

---

In Allergic Conjunctivitis

**Combipat**

- Synergistic action for complete control
- Effectively relieves itching, hyperemia and chemosis

**Goodbye Allergy, Hello Relief**
Descemet’s membrane endothelial keratoplasty (DMEK) now offers true structural replacement surgery for endothelial dysfunction and early evidence indicates that it may provide better results than predecessor endothelial keratoplasty procedures.

Figure 1: DSAEK: Results are very good but not anatomically perfect as 100-120 micron posterior stroma added into the graft.

DSEK Versus DMEK

<table>
<thead>
<tr>
<th>DSEK Advantages</th>
<th>DSEK Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Easy Learning Curve</td>
<td>• Relatively delayed rehabilitation</td>
</tr>
<tr>
<td>• Established over last 12 -13 years</td>
<td>• Poorer quality of vision</td>
</tr>
<tr>
<td>• Endothelial Cell Loss is less with favourable long term result</td>
<td>• Hyperopic shift (1.0-1.50 D)</td>
</tr>
<tr>
<td>• Can be done in any endothelial dysfunction</td>
<td>• Higher rejection rate (7% Vs 0.9% in DMEK)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DMEK Advantages</th>
<th>DMEK Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Very quick rehabilitation – 1 week.</td>
<td>• Difficult learning curve</td>
</tr>
<tr>
<td>• No hyperopic shift</td>
<td>• Tissue damage is high</td>
</tr>
<tr>
<td>• Good quality of vision</td>
<td>• High donor dislocation (20% Vs 4%)</td>
</tr>
<tr>
<td>• Least rejection rate (0.9%)</td>
<td>• Long term data only few</td>
</tr>
</tbody>
</table>

Why DMEK?

Endothelial keratoplasty is now well established as the treatment of choice for endothelial dysfunction. Compared to PK it offers the advantages of faster visual rehabilitation, better refractive outcomes, better tectonic support and lesser chances of rejection.

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Disha Eye Hospitals; Barrackpore; Kolkata 700120
E-mail: basak_sk@hotmail.com

However DSAEK is not a true anatomic replacement surgery. The stroma-to-stroma interface and a slight hyperopic shift which causes suboptimal visual outcome in the 6/6 – 6/9 range.

Melles et al performed a pure Descemet’s membrane–endothelium complex transplant to address some of these issues in 2006 and named it Descemet’s membrane endothelial keratoplasty (DMEK).¹

Over the past 5-6 years DMEK has become popular and slowly replacing DSEK as the surgery of choice for diseased endothelium. Surgeons and researchers have understood much about this surgical procedure.
Donor selection

Like in DSEK, donor tissue with high endothelial cell count (>2500 cells/mm²) and good cellular morphology is used. However donor age is an important factor and slightly older donors (55–70 years) are preferred. In younger donors the DM is strongly adherent to stroma and tears during graft preparation and these form tighter scrolls which are difficult to unfold. Whereas in older donors, the DM becomes very fragile. 2-4

![Figure 2A) Pre-Op Anterior segment OCT in PBK.](image)

Graft preparation

Handling the DMEK graft is a very difficult task. The DM-endothelium layer is extremely thin (<50um) and has a tendency to roll itself into a scroll shape with endothelium side outward. This makes preparation of graft, delivery to anterior chamber and unfolding the most challenging surgical steps.

![Figure 2B) Post-Op 4 hours following DMEK](image)

Graft insertion

Recipient preparation begins with a large sized descemetorhexis which is unlike in DSEK. This is to avoid overlap of host and donor tissue which might lead to detachment. Again, staining with trypan blue ensures that there are no DM remnants. As viscoelastics can

![Figure 3: Prepared DM roll ready for insertion.](image)
impair graft adhesion, it is better to avoid using them or use cohesive viscoelastics with thorough removal.

The donor DM-endothelium scroll is gently delivered using various methods like – modified IOL cartridge, ICL inserter, glass (Jones) tube, modified tubing etc. The wound is much smaller than in DSEK. Ensuring correct graft orientation is vitally important for graft adhesion. This is confirmed by using – S-mark, microscope with slit-lamp attachment, intraoperative OCT, etc. The scroll is unfolded by tapping in a shallow chamber and using bubbles for tighter scrolls. This is the most important step of the surgery because excessive manipulation leads to more endothelial cell loss and incomplete unfolding causes graft dislocation. Once the unfolding is complete, the anterior chamber is filled with air/ SF6 for about 15-30 minutes to allow graft attachment. The time required for graft attachment is less than in DSEK. An inferior peripheral iridectomy is done prior to graft insertion. This is to prevent post-operative pupillary block.

Back-up tissue: Because of the delicate nature of the graft, chances of tissue loss during donor preparation and unfolding is higher than DSEK. It is important to have an EK quality back-up tissue so that the surgeon can convert to DSEK should something go wrong.

**Post-op Complications**

Rates of graft detachment is higher in DMEK (34.6% in a multicentre study) and re-bubbling rates of 15-50% have been reported. Surgeons can choose to observe partial detachments or go ahead with re-bubbling within 2 weeks.

Primary graft failure is expected due to more manipulation with the graft than DSEK so the initial endothelial cell loss is higher. This becomes less as the surgeon becomes more experienced in the technique. Price et al published very low rejection rates of 0.7% in DMEK vs 9% in DSEK vs 17% in PK. However, in other reports it ranges between 1.4 to 5%. 7
Postoperative Vision and Refractive Outcome

In DMEK normal anatomy is restored and there is no double stromal interface. This gives better visual outcomes than DSEK and faster visual recovery. On an average 80-90% patients achieved 6/12 or better at 3 months post-op. Guerra et al. reported a study of 15 patients who had a DSAEK in one eye and a DMEK in the fellow eye where BCVA was statistically better in the DMEK eye by approximately one line and the majority of patients felt that this eye saw better.

There is a minimal change in refractive cylinder (less than 0.5 DCyl) and a mild hyperopic refractive shift of 0.32–0.49 D. This is surprising because the hyperopic shift in DSAEK is due to the myopic shape of the lenticule so theoretically there should not be any change with DMEK. So the new hypothesis is that the hyperopic shift in DMEK is due to change in stromal deturgescence.

Postoperative Endothelial Cell Loss

Endothelial cell loss at 1 year is reported to be between 19-36% at 1 year from various long-term studies. Similar to DSEK after a steep loss in first year, the attrition rate stabilises. Price et al reported 39% loss at 5 years vs 53% in DSEK. The initial cell loss is more due to more manipulation of delicate tissue both during preparation and unfolding. With improving surgical techniques this is expected to become less.

References

The term “pterygium” is a Latinized version of the Greek term “pterygion” meaning “small wing”; it is the name for the clinical condition consisting of wing-shaped ocular surface lesions extending from the bulbar conjunctiva onto the cornea, and was first described by Susruta in 1000 B.C. Duke-Elder defines a pterygium as a triangular shaped degenerative and hyperplastic process, occurring medially and laterally in the palpebral aperture, in which the bulbar conjunctiva encroaches onto the cornea. Since this description in 1954, much work has been done in identifying the cause and development of pterygium. While there is no specific causative factor highlighted, a multifactorial pathogenesis has been conventionally described.

The so called ‘Pterygium Belt’, described by Cameron (1965 monograph – ingrowth of subconjunctival tissue, whose stimulus is ultraviolet light) extends 37° degrees on either side of the equator, classically describing the presence of ultraviolet exposure on the pathogenesis of the pathological condition.

The prevalence ranges from 9.5% to 13% in India and is more common in rural parts of the country.

However presence of the pathology in other regions led to proposal and identification of other factors involved. A pterygium can occur de novo, in saw mill and glass factory workers, and may be related to dryness, ocular surface irritation and abnormal blinking patterns. Therefore a pterygium can occur nasally, temporally or inferiorly due to infrequent blinking, ocular surface micro-inflammation and focal trauma.

However, though classically described as degenerative lesions involving degradation of the Bowman's layer and abnormal elastotic response, the proliferative nature of the disorder resembles an aberrant wound healing response. Histopathologically, pterygia are characterized by a hyperplastic, centripetally directed growth of altered limbal epithelial cells accompanied by Bowman's layer dissolution, epithelial-mesenchymal transition, and an activated fibroelastic stroma with inflammation, neovascularization, and matrix remodelling, mediated through cytokines, growth factors, and matrix metalloproteinases. Intriguingly, pterygia have a predilection for the nasal limbus and affect only humans, possibly reflecting the unique ocular morphology of humans, compared with non-human primates and other animals. Although there is no consensus regarding the pathogenesis of pterygia, its association with sun-related disorders such as pinguecula and cataracts, climatic droplet keratopathy and squamous cell and basal cell carcinomas support the concept that UV radiation plays a major role in development of pterygium. Furthermore, the limbal predilection may be explained by the phenomenon of peripheral light focusing, in which incidental light passes through the anterior chamber and is focussed at the distal (nasal) limbus where limbal stem cells (LSCs) reside.

The general consensus proposes that a pterygium arises in response to mechanical injury and/or chemical irritation which then results in the alteration of the eye's defenses, thus further perpetuating the growth of the lesion. The hallmark of pterygium formation remain ultraviolet light exposure potentiating a focal subclinical limbal stem cell deficiency (proposed by Davanger and Evensen). This sequence of events is described in the schematic provided below.

### Classification

The pterygium has been classified in various ways in literature and these are outlined below.

### Conventional

<table>
<thead>
<tr>
<th>Stages</th>
<th>Tissues involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Posterior to the Limbus (pingueculum)</td>
</tr>
<tr>
<td>1</td>
<td>Involvement to the Limbus</td>
</tr>
<tr>
<td>2</td>
<td>Just on to the Limbus</td>
</tr>
<tr>
<td>3</td>
<td>Between the Limbus and Pupillary Margin</td>
</tr>
<tr>
<td>4</td>
<td>Central to the Pupillary Margin</td>
</tr>
</tbody>
</table>
GRADING (Alfred Anduze)  |  ACTIVE  |  PASSIVE
--- | --- | ---
PRIMARY (No prior surgical intervention)  |  Vascular, Corneal oedema at the head, +/- Stocker's line, Staining with 1% Rose Bengal stain  |  Hyalinised, Degenerative, Fibrotic, little or no vascular channels
SECONDARY  |  Raised, vascular, Corneal involvement > 2 mm, Recurrence post surgery  |  Flat, avascular regrowth, Atrophic, Corneal involvement < 2 mm

Sheppard and Johnston’s qualitative indicators

<table>
<thead>
<tr>
<th>&quot;Vascularity (V)&quot;</th>
<th>Conjunctival Tissue Thickness (C)</th>
<th>Corneal Tissue Thickness (K)</th>
<th>Pigment Line (P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V0 – None</td>
<td>C0 – Conjunctival ectasia or thinning</td>
<td>K0 – Corneal ectasia or thinning with flat overlying tissue</td>
<td>P0 – None</td>
</tr>
<tr>
<td>V1 – None, minimal papillary response</td>
<td>C1 – Flat</td>
<td>K1 – Flat</td>
<td>P1 – Faint interrupted pigment line</td>
</tr>
<tr>
<td>V2 – Normal</td>
<td>C2 – Minimally elevated</td>
<td>K2 – Minimally elevated</td>
<td>P2 – Minimal, similar to ipsilateral Hudson-Staheli line</td>
</tr>
<tr>
<td>V3 – Moderate, with vessel congestion. More dense than conjunctiva</td>
<td>C3 – Up to 1 mm, minimal or no epithelial staining</td>
<td>K3 – Up to 1 mm, minimal or no epithelial staining</td>
<td>P3 – Moderate, intensely colored pigment line</td>
</tr>
<tr>
<td>V4 – Severe, vessel congestion and dilation</td>
<td>C4 – Over 1 mm, with epithelial staining or erosion</td>
<td>K4 – Over 1 mm, with epithelial staining or erosion</td>
<td>P4 – Dense, deeply colored or elevated pigment line</td>
</tr>
</tbody>
</table>

Histopathological

1) Proliferative
2) Fibromatous
3) Atrophic Sclerotic

Grading System proposed by Prof. Donald Tan

T1 (Atrophic) – Episcleral vessels underlying the body of the pterygium are clearly visible and unobscured.

T2 – Intermediate (all pterygia that do not come under the purview of T1 and T3).

T3 – Episcleral vessels underlying the body of the pterygium are completely obscured by fibrovascular tissue.

Clinical Staging of Pterygium

Stage I: Exposure conjunctivitis

Increase in size and number of conjunctival vessels; mild to moderate congestion coinciding with periods of exposure, signs and symptoms of dryness; no formed lesion.

Stage II: Conjunctival pingueculum and pterygium

Presence of a distinct raised lesion in the bulbar conjunctiva, with or without abnormal vascularization and inflammation; symptoms of burning and itching; foreign body sensation.

Stage III: Limbal pterygium (ROUNDLET)

Leading edge of the lesion (head) is on or across the limbus, with or without an iron line at the conjunctival-corneal interface, vascularization and fibrous proliferation; symptoms more pronounced.

Stage IV: Corneal pterygium

Lesion is 2 mm or more onto and into the cornea; may be degenerative or vascular; granulation tissue invades the cornea between the epithelium and Bowman's membrane; a zone of dellen, oedema or iron staining cells may be present at the advancing head of the lesion; can be painful as it affects the corneal nerves directly or due to inflammation.

Stage V: Compound pterygium

Lesion has extended through Bowman's membrane into the corneal stroma; astigmatism is induced and vision is compromised; symptoms are more frequent and more severe; these lesions include bilateral pterygia (medial and lateral, same eye), secondary recurrences and rapidly progressive traumatic and chemical lesions.

Medical Management

In the initial stages, with the presentation with irritation, redness and watering, and no visual disturbances, management using lubricant drops, surface ‘soft’ steroids (no corneal penetration), topical decongestants, oral vitamin - C and UV blocking spectacles or agents can be advocated. Though these measures are directed at
symptomatic relief and preventing progression of the lesion, there is no conclusive evidence supporting the conservative management strategy described herewith.

**Surgical Management – Options And Strategies**

Pterygium surgery, conventionally has four principal goals: restoration of an uninterrupted refractive ocular surface; a low recurrence rate; minimization of complications; and a satisfactory cosmetic outcome.

The first reported surgical approach to pterygium management was described by Celsus, in which a needle and thread were passed under the pterygium. The thread was then elevated, the pterygium was completely lifted from the cornea to the canthus using a sawing motion, and the pterygium was excised. Unfortunately, this approach was often associated with pain, as well as blindness. Later, in the 16th century, it was noted that this operation should rarely be performed due to its dangers and the risk of recurrence. From the 1800s to the 1930s, various techniques were developed, but none proved particularly successful.

**D'Ombrain’s and McGavie’s Bare Sclera Technique**

The bare sclera technique was among the first described, wherein an area of bare sclera was left behind after pterygium excision, and allowed to heal. However it was associated with high recurrence rates and was given up.14,15

Variations in the technique included primary closure of the defect, splitting the head of the pterygium away from the limbus and repositioning the head of the pterygium. Though the variations, in the early half of the 20th century had good short-term results and few complications, these did not address the problem of recurrence, barring the complexity of the procedures themselves.

**Sliding Conjunctival Flap**

Sliding conjunctival flaps harvested from the inferior or superior bulbar conjunctiva were used to close the scleral defect. Although the recurrence rate reported by this technique is 1-5%, the surgery is technically complicated with suboptimal cosmesis.16,17

**Conjunctival / Conjunctivo – Limbal Autografting**

The major advance in the surgical management of pterygium arrived after the description of conjunctival – limbal autograft by Kenyon et al.18 The technique involved removal of the pterygium, followed by harvesting an adequately sized conjunctival autograft from the superior bulbar conjunctiva and suturing it in place of the sclera bed (raw area following pterygium excision). The superior bulbar conjunctiva is the preferred site for harvesting the graft, as it remains shielded from the deleterious effects of ultraviolet radiation. The mean recurrence rate following the procedure remains on an average, 0 – 15%. In a series from India, Rao et al reported the outcomes of this procedure in 53 eyes with 36 primary and 17 recurrent pterygia, with a mean follow-up of 18.9 ± 12.1 months. The recurrence rate was 3.8%.19

A bone of contention remained on the inclusion of limbal stem cells, especially in patients with ocular surface stress, the need of glaucoma filtration surgery with the need of preserving the superior bulbar conjunctiva. Tan et al proposed and used free conjunctival grafts with equivalent outcomes.20 The results of an approach using inferior conjunctival autografts were reported by Rao et al21, with a recurrence rate of 18.2%. The recurrence rate was found to be slightly higher than superior conjunctival autografts, highlighting the inferior quality of inferior bulbar conjunctival tissue (possibly due to UV light exposure).

However conjunctivo – limbal autografts were proven to be effective in preventing the recurrence in recurrent pterygia cases.22,23

The advent of fibrin glue simplified matters for the patient and surgeon, making significant reduction in the complexity of the procedure, surgical time, post operative comfort and cosmesis.24 – 31 However the recurrence rates seem variable amongst described studies, Koranyi et al. reporting the recurrence rate after the use of fibrin glue as 5.3% and after the application of suture as 13.5% 24, while Bahar et al reported that the recurrence rate with the use of fibrin glue was 11.9%, while it was 7.7% after the use of suture.25 Since fibrin tissue glue is costly and it has the risk of causing infection by transmission, the use of autologous blood fibrin has come as the alternative. Successful results have also been reported with respect to the use of autologous blood fibrin in conjunctival grafting procedure.32 – 35

**Tan’s Conjunctival Rotational Flap Technique**36

This technique is effective in addressing the need of conjunctival graft tissue in cases, where the availability of tissue falls short of the surgical bare sclera, following pterygium excision. The conjunctiva over the pterygium is carefully dissected bare of the attachments, harvested and placed in balanced salt solution, and used as the autograft tissue with the limbal edge facing the caruncle. Recurrence rates with the procedure has been reported at 4% 36, but is rarely used as the primary approach in pterygium management.

**P.E.R.F.E.C.T Surgery**

Dr Hirst from Australia reported a technique, claimed to have a recurrence rate of 0.5%; the ‘P.E.R.F.E.C.T’ technique - ‘Pterygium Extended Removal Followed by Extended Conjunctival Transplant'.
In this approach, an extensive conjunctival autografting of about 15 mm by 12 mm is done over the bare sclera bed. The advantages of this approach are less recurrence and a better cosmetic outcome as graft edge and the surgical scars are hidden in the fornices and caruncle. The main limitation is that this is time consuming and technically challenging procedure. Long-term results were recently reported for the Pterygium Extended Removal Followed by Extended Conjunctival Transplantation (PERFECT) study, which analyzed 1,000 consecutive pterygium procedures between August 2001 and September 2009, with a mean follow up of 616 days. Of these cases, 81% were primary pterygia and 19% were recurrent. There was only one post-operative recurrence (0.1%) in this series. Overall, six patients required further surgery, due to hyperemic graft (three patients), exotropia (one patient), granuloma (one patient), inclusion cyst (one patient), and recurrence (one patient). The results of this study involving a single surgeon employing relatively large excisions and grafts suggest an extremely low recurrence rate, an acceptable complication rate, and good cosmetic outcomes. However, replication of these findings by surgeons in other centers is needed.

Cultivated Conjunctival Transplantation

Another method of closing the surgical defect involves the use of an ex-vivo expanded conjunctival epithelial sheet on an amniotic membrane substrate. Initially used by Tan et al, to reconstruct the ocular surface after excision of an extensive naevus, the approach was considered and studied in pterygium surgeries, considering the advantages of early re-epithelization of the ocular surface with minimal postoperative inflammation. However considering the complexity of the procedure and the recurrence rates of nearly 23% in the reported studies, comparing with standard amniotic membrane transplantation, the procedure is now considered secondary in ocular surface reconstruction following extensive pterygium excision.

Amniotic Membrane

Amniotic membrane possesses antiangiogenic and anti-inflammatory properties, which may be useful for treating pterygium, implicating the role of inflammatory cytokines and growth factors on the pathogenesis. An additional advantage is that it removes the need for harvesting large autografts, thereby minimizing iatrogenic injury to the rest of the conjunctival surface. The conventional de-epithelialized cryopreserved human amniotic membrane, freeze dried or lyophilized membranes have been evaluated in the management strategies. Recurrence rate of pterygium with amniotic membrane use ranges from 12 to 40 %.

Delayed vascularization of amniotic membrane is thought to be responsible for the delayed recurrence after pterygium surgery. Although, this appears to be a safe and easy solution, avoiding the need for harvesting conjunctival autografts, the cosmesis and the recurrence rates are not proven superior or equivalent with conjunctival auto-grafting for primary pterygium surgery.

Use of Adjunctive Agents in Pterygium Surgery

Mitomycin – C

This is an alkylating agent which destroys the DNA synthesis and inhibits mitosis and protein synthesis. It is used in pterygium surgery to stop subconjunctival tissue proliferation and the fibroblastic activity. It is also used both intraoperatively and postoperatively in pterygium surgery at concentrations between 0.01% to 0.05%. The recurrence rates vary widely between 0% (used in conjunction with conjunctival autograft) to 40% (used with the bare sclera technique). The success rates go up with increasing dosages and exposure times, however this is associated with a proportionate increase in complications, thereby limiting its usage in managing aggressive and recurrent pterygia.

5 – Fluorouracil

Fluorouracil which is a pyrimidine analogue, inhibits the thymidylate synthetase and prevents fibroblast proliferation. After the excision of pterygium, it is usually kept on the bare sclera for 3–5 min by being impregnated with sponge pieces in 25 mg/ml concentration. Recurrence rates varying between 5 and 25 % were reported with Akarsu et al reporting a recurrence 25 %, while Bekilebe et al. reported a recurrence rate by 11.4 and 8.7 % in two separate studies they conducted. Salustiano et al reported a recurrence rate by 5.83 %. The antecedent complications with its recurrence rates not being comparably superior to conjunctival autografting restricts the usage of 5 – fluorouracil in primary and recurrent pterygium surgeries.

Thiotepa

Thiotepa, an alkylating agent analogous with nitrogen mustard, inhibits mitosis and division within rapidly multiplying tissues. After the surgical excision of pterygium, it is used four times a day for 6–8 weeks in the form of a drop in 0.05 % concentration. The recurrence rates observed in the wake of this procedure have been reported to be between 0 and 28 %. Thiotepa is not preferred for use today since it causes black pigment deposits on the eyelids and hyperpigmentation of the skin as well as allergic reactions and local irritations.
Anti – VEGF Agents

The fact that VEGF level in the pterygium tissue was found to be higher than normal conjunctiva suggests that the use of anti-VEGF drugs during the treatment could be effective.50,51 Ranibizumab and Bevacizumab, as the anti-VEGF drugs, are applied on the eye in the form of a subconjunctival or topical drop. Teng et al. showed that vascularization in the pterygium tissue had diminished after the subconjunctival Bevacizumab injection.50

Kocabora et al., in their study in which the uses of subconjunctival Bevacizumab and MMC were compared, found that the recurrence rate within the group to which Bevacizumab was administered proved to be 66.7%, whereas the recurrence rate within the group to which MMC was administered was found as 26.7%.52 Again, in various studies conducted so far, it was shown that subconjunctival practice had not prevented the development of recurrence.53 - 55 Kasetsuwan et al., on the other hand, demonstrated that the use of topical Bevacizumab had prevented the recurrence of pterygium.56 Again, in the same way, there have been studies showing that the postoperative topical Bevacizumab minimizes the recurrence of pterygium57-59, and it seems that there is the need to conduct more extensive studies to determine the long-term efficiency and reliability of anti-VEGF drugs.

Recurrence Rate by Surgical Technique and Adjuvant Therapies

<table>
<thead>
<tr>
<th>Techniques</th>
<th>Recurrence rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bare sclera</td>
<td>38 – 88</td>
</tr>
<tr>
<td>Conjunctival autograft</td>
<td>5 – 30</td>
</tr>
<tr>
<td>Conjunctival autograft with fibrin glue</td>
<td>5.5 – 11.9</td>
</tr>
<tr>
<td>Limbal conjunctival autograft</td>
<td>0 – 15</td>
</tr>
<tr>
<td>Amniotic membrane graft</td>
<td>6 – 40</td>
</tr>
<tr>
<td><strong>Adjuvant therapies</strong></td>
<td></td>
</tr>
<tr>
<td>MMC</td>
<td>0 – 40</td>
</tr>
<tr>
<td>5-FU</td>
<td>5 – 25</td>
</tr>
<tr>
<td>Anti-VEGF</td>
<td>66.7</td>
</tr>
<tr>
<td>Radiotherapy</td>
<td>0 – 50</td>
</tr>
</tbody>
</table>

Management of Complicated Cases

Anterior Lamellar Keratoplasty can be used to address the corneal thinning and scarring associated with pterygium excision, especially in complex and recurrent ones. However the procedure has inherent limitations with regards to tissue availability, graft rejection and transmission of infection and the complexity of surgical maneuvers involved.60

In cases of double headed pterygia, a combination of approaches using conjunctival rotational graft and conjunctival autografting61, amniotic membrane with conjunctival autografting62 are employed. The conjunctival autograft is essentially placed at the nasal edge, to reduce the chances of recurrence, considering UV light as some of the factors implicated in recurrence.

Immediate Complications

Appropriate postoperative care helps reduce complications, but immediate complications can include excessive bleeding, conjunctival chemosis, graft oedema, haematoma below the graft, a localized epithelial defect, loose sutures, conjunctival wound dehiscence, infection, and corneal scarring. While some complications may resolve without intervention, such as a localized epithelial defect or conjunctival chemosis, others require specific management.63

Late Complications

The major late complication following pterygium surgery is recurrence. Recurrence rates vary by procedure, with bare sclera excision having the highest rate, followed by excision with amniotic membrane grafting, and by conjunctival autografting.63

Recurrence is heralded by hypervascularity, leading to limbal violation by abnormal conjunctival neovascularization. The risk factors for recurrence include male sex and a history of high sun exposure.64 Nontranslucent pterygia have been associated with an increased risk of recurrence65, as have several biomarkers related to proliferation, inflammation, fibrosis, and angiogenesis. While further evaluation of these important biomarkers is needed, they point out the need to develop treatments that target specific receptors if the goal of eliminating recurrence is to be achieved.65

Other late complications include those related to adjunct therapy (such as Mitomycin C), suture-related inflammation, Tenon’s capsule cyst, diplopia and strabismus, scleral complications, corneal perforation, graft inversion or retraction, lens changes, and graft necrosis, as well as more unexpected complications, such as ptosis, entropion, symblepharon, and iris atrophy.63

Strategies For Pterygium Recurrence66

Pterygia recurrence heralded by hypervascularity, limbal violation, conjunctival and corneal neovascularisation can be managed according to the complexity and presentation patterns. The conventional approach in the management of recurrent pterygia remained excision with conjunctival autograft and use of intraoperative anti-metabolites. However topical steroid therapy enhanced by increased frequency or potency, oral Doxycycline (anti-collagenase) and topical Azithromycin (for doxycycline intolerant patients) are beneficial in the stage of hypervascularity. Presence of limbal violation, conjunctival and corneal vascularisation mandates...
the usage of subconjunctival injection of antifibrotic agents, steroids or anti-VEGF agents. However long term studies are yet to prove these conservative measures in the long run.

Bibliography

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Medical Management of Uveitis - Few Practical Tips

Jyotirmay Biswas, Eliza Anthony

Most pertinent aspect of uveitis is how to manage a patient with uveitis. This is because uveitis is capable of causing severe visual morbidity and even blindness. Few practical tips in management of uveitis are given below.

Prior to management, a precise clinical diagnosis of uveitis has to be made. This should be followed by aetiological diagnosis. Investigations of uveitis including ancillary tests help us to arrive at an aetiological diagnosis. There are several conditions which can mimic uveitis. For example nummular keratitis can be mistaken for keratic precipitates. Conjunctivitis and scleritis are sometimes mistaken for anterior uveitis. Endogenous endophthalmitis similarly can mimic panuveitis. A careful history can distinguish between the two. A close watch is mandatory in cases of panuveitis with intense fibrinous reaction and hypopyon (Figure 1) and one need to rule out any septic foci, history of recent dental procedures, surgery, hospital admission, poor glycaemic control in order to rule out endogenous endophthalmitis. Diffuse infiltrating type of retinoblastoma can involve the anterior segment of the eye as exudates in the anterior chamber or even hypopyon. Masquerade syndromes presenting with pseudohypopyon (Figure 2a, 2b), which is always white, can be easily be differentiated from hypopyon in uveitis.

Anterior uveitis is usually managed by topical steroids and mydriatic cycloplegic agents (Figure 6). Topical steroid preferred in such cases is Prednisolone acetate. Frequency of topical steroid is determined by severity of inflammation (Figure 7). A severe fibrinous anterior uveitis, or an anterior uveitis with hypopyon may require topical steroid as frequently as every 15 minutes. This can be tapered to

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every half hour, then every 1 hour. Subsequently topical steroids can be tapered over 6 weeks usually. Topical steroid should be combined with short acting mydriatic cycloplegic agent like homatropine used initially 3 times a day and then gradually tapered. In case of fibrinous anterior uveitis atropine eye drops can be used for first few days to prevent synechiae formation. This can be followed by short acting mydriatic cycloplegic agent like homatropine drops. Immunosuppressive agent is required in addition in juvenile idiopathic arthritis associated anterior uveitis. Preferred drug in such condition is methotrexate oral or subcutaneous injection. In management of anterior uveitis, one should rule out infective aetiology like tubercular or viral anterior uveitis. Tubercular uveitis often presents with granulomatous anterior uveitis. One can do anterior chamber tap for polymerase chain reaction for mycobacterium tuberculosis. Viral anterior uveitis often presents with rise of intraocular pressure. An anterior chamber tap can be subjected to polymerase chain reaction for herpes group of viruses like cytomegalovirus, herpes simplex and herpes zoster virus in such cases.
Intermediate uveitis should always be suspected in anterior uveitis. Slit lamp examination or 90 dioptre examination can find out anterior vitreous cells in such cases and can be confirmed by indirect ophthalmoscopy. Intermediate uveitis can be managed by modified Kaplan's approach (Figure 8). First step is posterior subtenon injection of Triamcinolone acetonide which is given in the upper temporal quadrant by Nozik technique. This can be repeated every 3 to 4 weeks. Usually 2 to 3 injections are required. Main problem in this modality is rise of intraocular pressure which can occur up to 20% cases. It can also cause ptosis. In nonresponsive cases, oral Prednisolone can be given at 1 mg /kg of body weight (Figure 9). This is tapered by six weeks to eight weeks. Immunosuppressive agents like Mycophenolate mofetil or Azathioprine can be given in unresponsive cases. One should rule out infective aetiology like tuberculosis in such cases.

Infectious type of intermediate uveitis particularly associated with tuberculosis, should be treated with oral steroids and anti-tubercular drugs. In case of recalcitrant intermediate uveitis, vitrectomy often helps. Macular oedema due to intermediate uveitis can be treated with posterior subtenon injection of Triamcinolone acetonide or by Dexamethasone intravitreal implant (Ozurdex). Ozurdex is much more potent than triamcinolone acetonide injection. This often helps in resolution of intermediate uveitis with vitritis. In case of elderly persons with intermediate uveitis one should rule out intraocular lymphoma. Intraocular lymphoma can mimic a tubercular choroiditis like picture (Figure 10a). In cases of high suspicion, especially in elderly patients, cytopathological study on the vitreous tap sample can reveal the malignant lymphoma cells and confirm the diagnosis (Figure 10b). MRI can be done in these cases to rule out central nervous system lymphoma.

In case of posterior uveitis, the morphological diagnosis should be made. For example toxoplasmic retinochoroiditis (Figure 11 & 12) is usually located in the posterior pole and have localized vitreous haze. This is often whitish in colour and cause retinitis. Toxocara granuloma also occurs at the posterior pole with macular drag evident on fundus examination (Figure 13). Choroiditis is deeper
and retinal vessels are seen over it. Serpiginous choroiditis is common posterior uveitis in our country. It often has geographic border and can involve the posterior pole (Figure 14) as well as the periphery. Multifocal serpiginous choroiditis (Figure 15) is often associated with tuberculosis. So, in all cases of serpiginous choroiditis, tubercular aetiology should be rule out. This is done by high resolution computerized tomography (HRCT) scan of chest, Mantoux test and QuantiFERON TB Gold test.

In case of positive Mantoux test, QuantiFERON TB Gold test or positive high resolution CT (HRCT) chest findings, one needs to give anti-tubercular treatment with steroid. The duration of anti tubercular therapy should be 9 months or more. In case of involvement of the posterior pole particularly the macula, one should give intravenous Methylprednisolone 1 gm daily for three consecutive days in an adult. This should be done under physician supervision. This should be followed by oral steroid. In case of Acute Posterior Multifocal Placoid Pigment Epitheliopathy (APMPPE), we give oral Prednisolone at the dosage of 1 mg per kg of the body weight followed by tapered dose of oral Prednisolone.

In case of toxoplasmic retinochoroiditis, one can use Clindamycin (Dalacin C) 300 mg one tablet four times daily or Tab. Bactrim DS two tablets stat, one tablet twice daily for six weeks. Oral corticosteroid is added after 48 hrs. Posterior uveitis of viral aetiology particularly Acute Retinal Necrosis has got characteristic feature, it often present with retinitis with scalloped margin in the periphery. In these cases, one should do anterior chamber tap or vitreous biopsy to find out the precise virus infection. Such aqueous or vitreous tap should be subjected to polymerase chain reaction for viral aetiology. In case of Acute Retinal Necrosis treatment (Figure 16) should be started.
as soon as possible. It is an ophthalmic emergency. One should give intravenous Acyclovir 500 mg every eight hourly for 7 to 14 days depending on the response. This should be followed by oral Acyclovir 800 mg five times daily or tablet Valacyclovir one gram three times daily. We usually prefer Valacyclovir for about 90 days.

In case of panuveitis, one should rule out Vogt-Koyanagi-Harada (VKH) disease, sympathetic ophthalmia, sarcoidosis, tuberculous panuveitis and Behçet’s disease. Panuveitis should be treated aggressively. In case of Vogt-Koyanagi-Harada (VKH) disease in acute stage, intravenous Methylprednisolone one gram daily for three consecutive days is given. This should be followed by immunosuppressive agents like Azathioprine or Cyclosporine (Figure 17). Azathioprine is given 50 mg tablet one tablet three times daily followed by one tablet two times daily for a month and one tablet once daily for a month. Treatment is often given for six to eight months. Biologic agent has now emerged as a new modality of treatment. It should be given in Behçet’s diseases as first line of therapy. The preferred drug is either Infliximab (Remicade) or Adalimumab (Humira). Infliximab is given 5 mg per kg of the body weight by intravenous infusion. Three such injections are required initially. It is given on day one, two weeks and then six weeks. There after it is continued as per clinical uveitis is a challenging disease and can cause visual morbidity if not treated properly. Utmost attempt should be made to control this disease. Adalimumab is given 80 mg initially by subcutaneous injection followed by 40 mg every two weeks. In case of uveitis one should rule out infective aetiology by clinical examination as well as laboratory tests because the treatment is quite different in noninfectious and infectious uveitis.

Systemic steroid remains the mainstay of treatment in noninfectious posterior and panuveitis. The rapid action of the drug, familiarity of its usage and known side effects makes it a popular choice in noninfectious posterior and panuveitis. Immunosuppressive agents are required in steroid resistant cases or where oral steroid is contraindicated. In certain type of uveitis, immunosuppressive agents have become the first choice of treatment. This includes Behçet’s disease, Vogt Koyanagi Harada disease, sympathetic ophthalmia and juvenile idiopathic arthritis. In recent years biologic agents like Infliximab and Adalimumab emerged as first choice in Behçet’s disease.

In the era of 21st century tremendous changes have occurred in the diagnosis and management of uveitis. The knowledge of changing pattern of uveitis, newer diagnostic tests like polymerase chain reaction, optical coherence tomography, newer modalities of treatment like biologics and intravitreal injections is essential to move on for successful management of uveitis.

Prompt and proper management uveitis is of paramount importance to provide comfort to the patient as well as preservation of the vision. Ophthalmologists therefore should be aware of various modalities of treatment and its efficacy, precautions and side effects.

**Suggested Reading:**

In the modern era of medicine, localized drug delivery systems have become very popular over the decades because of better bioavailability of a particular drug inside a particular tissue, avoiding untoward systemic effects. Like any other routes of drug delivery, conventional localized drug delivery has its own merits and demerits. For example, topical therapy has disadvantages like spillage and wastage, drug depositions, decreased bioavailability related to pH change, allergy and preservative-related side effects. Intravitreal injections have been associated with serious side effects such as cataract formation, intraocular pressure rise and posterior segment complications like retinal detachment and endophthalmitis. Substantial advances in understanding the aetiopathogenesis of a particular ocular disease have provided the foundation for the discovery and development of future drug delivery systems. Newer localized drug delivery technologies are emerging primarily based on the application of a small amount of direct electrical current to facilitate the drug delivery to the tissues.

Iontophoresis is such a safe and quick therapeutic drug delivery system which delivers high concentration of a particular drug to a desired specific site. It is a novel electrophysical phenomenon which is based on the principles of electrophoresis (enhanced movement of ionic elements by means of electric field), electro-osmosis (electric field induced convective flow of charged and neutral particles) and electroporation (alteration of tissue barrier by means of electric field application).

German scientist Wirtz was the first one to use iontophoresis for delivering drug in the treatment of corneal ulcer and few other ocular conditions in 1908. This method has several applications in ophthalmology, such as to achieve therapeutic levels of drugs in the anterior and posterior segments of the eye for the treatment of diseases such as keratitis, uveitis, and endophthalmitis etc. Transcorneal and transscleral iontophoresis have been used in ophthalmology for drug delivery of antibacterial, antifungal, anti-inflammatory, and antiangiogenetic agents.

Iontophoresis utilises a low current to drive charged molecules across the intact sclera or cornea for delivery of therapeutic drug concentrations to the inner eye and to facilitate ion penetration into the tissue (figure 1). This particular type of platforms are limited to drugs of small size, ionic nature and low molecular weight. In many cases, existing drug formulations need to be reformulated to confer an electric charge so that they can be utilised within the system. One has to be careful as this reformulation can sometimes lead to significant alterations in bioavailability of a particular drug.

Recently Cohen et al has published a report of treating 40 eyes of uveitis patient with dexamethasone phosphate iontophoresis system. The device used by them was EyeGate II Delivery System (EGDS) manufactured by EyeGate Pharmaceuticals Inc. (figure 2). Single iontophoresis treatment with dexamethasone phosphate had allowed 60% of the patients of their study to achieve complete resolution of anterior chamber reaction after 28 days.

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Macroesis is another non-invasive method of drug delivery that uses an alternating current to deliver drugs to target tissues. It has similar principle like iontophoresis. Unlike iontophoresis it has the ability to deliver both small and large compounds, programmable dose control and potentially a lower cost of care.

Iontophoresis and macroesis are used now to deliver triamcinolone acetonide and dexamethasone acetate in non-infectious uveitis and ranibizumab for age related macular degeneration, iodide for dry eye disorder.

In conclusion, the iontophoresis seems to be a promising option of local delivery of drugs in management of ocular pathologies. Further studies are needed to develop practice guidelines and evaluate the optimal dosages and safety of drug delivery system.

References


Histopathological Analysis of Corneal Button Specimens In A Tertiary Care Eye Institute of North-Eastern Part of India.

Dipankar Das, Anil Kumar Ghanta, Dhaval Patel, Panna Deka, Kalyan Das, B. M. Agarwala, Jnanankar Medhi, Harsha Bhattacharjee, Akshay Chandra Deka, Apurba Deka

Abstract: Analysis of 122 corneal specimens was done retrospectively in Ocular Pathology Laboratory in a referral institute of Northeast India from the period of November 2003 to May 2008. Corneal buttons were obtained after Penetrating Keratoplasty and processed routinely. The histopathological diagnosis of the patient's age, sex and preoperative clinical indications were analyzed and compared with previous studies. In this part of the country, the most common pathological finding of the corneal button specimen was found to be fibrosis with a scar. The present study is important to reveal the common histopathological diagnosis of corneal buttons from Penetrating Keratoplasty in Northeastern zone of the country.

Key Words: Histopathological studies, corneal buttons, Penetrating Keratoplasty.

Introduction

Penetrating Keratoplasty (PKP) is the ultimate treatment of choice for a case of the corneal blindness of different aetiologies, whenever applicable. But due to a scarcity of donor cornea, very few of the needy patients were being operated in this part of the country.

This retrospective study was done to analyze the histopathological diagnosis of the patients for whom PKP was done in this area of India and also to find out the correlation of the recipients in respect of age, sex and clinical indications. As our institute is a tertiary level eye care referral centre in the North-East region of the country and doing most of the Keratoplasty operations, this study might reflect the profile of corneal blindness cases of this region almost to an appropriate level. The primary indications for penetrating keratoplasty vary not only in different countries but also within different zones of a country. The primary indications for PKP reported in Europe and America were bullous keratopathy, keratoconus and Fuchs corneal dystrophy. 1, 2, 3 Corneal scar was reported predominantly in other studies. 4,5,6,7

Materials and Methods

The study was done at a tertiary eye care centre in North-eastern part of India. Total 122 specimens from November 2003 to May 2008 were retrieved and examined by the ocular pathologist. The corneal button specimens of patients undergoing PKP were sent to histopathology department for microscopic examination. The specimens were fixed in 10% neutral buffered formalin and processed routinely. Tissues were sliced in 3µm size sections. Haematoxylin eosin stain was performed for the tissue sections. Histopathological record of the specimen was reviewed, and data including the patients' age, sex, date of surgery, preoperative clinical diagnosis and pathologic diagnosis were recorded.

Preoperative clinical indications were categorized into seven broad types: 1) Adherent leucoma, 2) Old keratitis with scar, 3) Bullous (including pseudophakic and aphakic) keratopathy, 4) Refractory corneal ulcer with or without perforation, 5) corneal dystrophies, 6) corneal degenerations and 7) Others. Others category was subdivided into a)corneal penetrating injuries, b)anterior staphyloma, c) failed graft and d) keratoconus. From histopathological point of view diagnoses were divided into six categories: 1) Scar with fibrosis, 2) Adherent leucoma, 3) Bullous keratopathy, 4) Corneal oedema with inflammation, 5) Corneal dystrophies, and 6) Corneal degenerations.

Results

A total of 122 patients (122 specimens) from 85 male (69.6%) and 37 female (30.4%) were included in our study. Average age of the patients was 41.3 years (range: 4-80 years). More than half of the patients belonged to age group within 21 -50 years (53.2%). Age distribution was as follows: 4-10 years (n=6; 4.9%), 11-20 years (n=10; 8.1%), 21-50 years (n=65; 53.2%) and 51-80 years (n=41; 33.6%). Total 66 (54%) specimens were collected from the right eye while rest 56(46%) from the left eye. The preoperative clinical indications were 1) Adherent leucoma (n=28; 23%), 2) Old keratitis with central scar (n=24; 19.7%), 3) Bullous keratopathy (n=20; 16.4%), 4) Refractory corneal ulcer with or without perforation (n=19;15.6%), 5) Corneal dystrophies(n= 7; 5%), 6) Corneal degenerations (5;4%) and 7) Others(n= 19; 15.6% including perforating corneal injuries-6.5%, anterior staphyloma- 4%, failed graft- 3.3% and keratoconus-1.6%).

Histopathologically the diagnoses in order of decreasing frequency were 1) corneal scar with fibrosis (n=75; 61.5%) (Figure 1&2), 2) adherent leucoma (n=20; 16.4%) (Figure 3), 3) corneal oedema with inflammation (n=11; 9%), 4) bullous keratopathy (n=9; 7.4%) (Figure 4), 5) spheroidal degeneration (n=6; 4.9%) (Figure 5) and 6) lattice dystrophy (n=1; 0.8%). (Figure 6)
Figure 1: Corneal pannus with stromal vascularization and scarring (H&E, X 200).

Figure 2: Section of the tissue showed corneal scarring (H&E, X 100).

Figure 3: Section of the tissue showed corneal scarring with adherence of iris tissue.

Figure 4: Section of the corneal tissue showed hydropic degeneration of basal epithelial cells with oedema of the stroma and loss of endothelial cells in bullous keratopathy (H&E, X 400).

Figure 5: Basophilic globular bodies in the epithelium and anterior corneal stroma consisting of spheroidal degeneration (H&E, X 200).

Figure 6: Histopathology of corneal button showing lattice corneal stromal dystrophy (H&E, X 100).
Discussion

In our study, most of the patients belonged to dense corneal opacity as a result of the scar with fibrosis (61.5%). The term corneal scar was used to include the conditions caused by sequelae of keratitis, chemical burn and perforating corneal injuries as described by Chen et al. Most of the patients were operated for the optical purpose (n=96; 78.6%) after the eye became quiet. Those with refractory corneal ulcer with or without perforation were undergone either therapeutic (n=19; 15.6%). In only 5 cases tectonic (4%) and 2 cases (1.6%) lamellar keratoplasty was performed. After analysis, we found a good correlation between clinical and histopathological diagnosis (Table 1). The cases with failed graft and keratoconus were not separately identified and included in corneal scar and fibrosis (category 1). This study resembles the previous studies done by Dandona et al, India, Sony et al, India, Chen et al, Taiwan and Zhang and Xu, China (Table 2) to a great extent showing corneal scar as the major indication of penetrating keratoplasty in other parts of the country and abroad.

Next common histopathological diagnosis was adherent leucoma, which was responsible for 16.4% of transplantation surgeries. In our study we have separated this category after analyzing the clinical case report to show the magnitude of the problems of impending or frank cases of corneal perforation following penetrating corneal injury, keratomalacia or ulcerative keratitis. Only those specimens with adherent iris tissue behind the opacified corneas were included in this category. In no other reviewed studies this category of diagnosis was described separately. So comparison could not be done in this regard. It might be as because the cataract surgeries with IOL implantation were getting priority since late 1990's in this part of the country. In spite of that number of buttons showing bullous keratopathy was less in comparison to other studies done by Dobbins et al, USA (39%), Liu and Slomovic, Canada (34.7%),

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Category</th>
<th>Number (%)</th>
<th>Sl. No.</th>
<th>Category</th>
<th>Number (%)</th>
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<td>28 (23)</td>
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<td>Corneal scar + fibrosis</td>
<td>75 (61.5)</td>
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<td>24 (19.7)</td>
<td>2</td>
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<td>20 (16.4)</td>
<td>3</td>
<td>Corneal oedema with inflammation</td>
<td>11 (9)</td>
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<td>4</td>
<td>Refractory Corneal ulcer ± perforation</td>
<td>19 (15.6)</td>
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<td>Bullous Keratopathy</td>
<td>9 (7.4)</td>
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<td>5</td>
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<td>5</td>
<td>Spheroidal degeneration</td>
<td>6 (4.9)</td>
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<td>6</td>
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<td>5 (4.0)</td>
<td>6</td>
<td>Lattice dystrophy</td>
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<td>7</td>
<td>Others</td>
<td>19 (15.6)</td>
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</table>

A Perforating injury 8 (6.6)  
B Anterior Staphyloma 5 (4)  
C Failed Graft 4 (3.3)  
D Keratoconus 2 (1.6)

Table: 1 Table showing correlation between clinical and histopathological diagnosis

<table>
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<tr>
<th>Study done by</th>
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<th>Bullous keratopathy</th>
<th>Degeneration / dystrophy</th>
<th>Keratoconus</th>
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<td>6.9%</td>
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<td>USA</td>
<td>11.2%</td>
<td>-</td>
<td>39%</td>
<td>23.2%</td>
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<td>27.9%</td>
<td>-</td>
<td>17.6%</td>
<td>4.5%</td>
<td>2.5%</td>
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<td>1987-1995</td>
<td>India</td>
<td>28.1%</td>
<td>-</td>
<td>22.4%</td>
<td>8.4%</td>
<td>6%</td>
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<td>India</td>
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<td>-</td>
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<td>3.9%</td>
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<td>-</td>
<td>12.3%</td>
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<tr>
<td>Liu et al</td>
<td>1986-1995</td>
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<td>10.6%</td>
<td>-</td>
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<td>7.7%</td>
<td>10%</td>
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<td>France</td>
<td>-</td>
<td>-</td>
<td>27.7%</td>
<td>9.1%</td>
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<td>-</td>
<td>-</td>
<td>25.8%</td>
<td>13.8%</td>
<td>9.2%</td>
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<tr>
<td>Mamalis et al</td>
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<td>-</td>
<td>28.2%</td>
<td>5.8%</td>
<td>22.85%</td>
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<td>Present study</td>
<td>2003-2008</td>
<td>N/E India</td>
<td>61.5%</td>
<td>16.4%</td>
<td>7.4%</td>
<td>5.7%</td>
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</table>

Table: 2 Table showing the comparison about the major indications for penetrating keratoplasty in different countries
and Legeais et al, France(27.7%).\textsuperscript{1,2,3} On the other hand, the study by Lixin Xie et al, North China (6.9%) closely agreed our result (7.4%). Remarkably in our study, cases of spheroidal degeneration were high (4.9%) though that of corneal dystrophy was less (0.8%). We had only two cases of keratoconus (1.6%) though not evidenced histopathologically. It might be due to that keratoconus cases without fibrosis or corneal opacity were usually not operated but treated with other modalities like glasses or RGP contact lenses. Failed graft cases were also found very less in number (n=4) as because most of the patients in this area belonged to rural areas having low socio-economic status so unable to bear the huge expenses for repeat PKP for the second or third time.

To conclude it must be mentioned that though the number of specimens were much less in our study, it might be able to reflect the scenario regarding the histopathological diagnosis of the recipients of PKP in this part of the country. Moreover, this is the first ever study of this kind performed in this zone. Earlier studies done in other parts of India closely resembled our study like Dandona et al and Sony et al.\textsuperscript{5,6} In spite of that, further similar study on a larger scale is needed for a better conclusion.

References:

Autogenous Auricular Cartilage is Effective in Total Upper Eyelid Reconstruction with Modified Cutler-Beard Procedure

Salil Kumar Mandal, Aparna Mandal

Abstract: Malignant tumour in upper lid is really a surgical challenge to the oculoplastic surgeon. Full thickness defect created after removal of large tumour promptly treated with modified Cutler-Beard Procedure using autogenous auricular cartilage. Surgical procedure is two stage. In first stage, removal of the tumor followed by full thickness flap repaired. In second stage opening the closed lid with lid margin repair. Post operatively there is good anatomical, functional, and cosmetic restoration of the eye lid similar to the other eye. Aim: To evaluate the efficacy of the modified Cutler-Beard procedure using autogenous ear cartilage for tarsal plate reconstruction in the repair of 70-100% upper eyelid defects, and also to evaluate the cost effectiveness and safety measure of using autogenous auricular cartilage for tarsal plate reconstruction. Methods: This is a prospective, interventional case series of sixteen patients over a period of three years. Patients with upper eyelid defects, secondary to removal of tumour, greater than or equal to 70% were included. Of these patients, those with lymph node involvement, distant metastasis, lower eyelid involvement, corneal infiltration or intra-orbital extension were excluded. FNAC was done in all the cases. Created defect was measured in mm (length and width) and later expressed in percentage. Pre and post operative measurement of Levator Palpebrae Superioris (LPS) was done. Pre and post operative measurement of margin to reflex distance (MRD1) were also noted. Results: Upper eyelid recreation was successful in all patients without complications. Pre-operative Levator Palpebrae Superioris (LPS) action ranged from 0-4 mm, while post-operative LPS action was 12-14 mm. Pre-operative margin-to-reflex distanced (MRD1) ranged from -4 millimeters to -1 mm, while post-operative MRD1 was +3 to +4 millimeters. The follow-up period ranged from six months to two years. Every patient had a successful upper eyelid reconstruction. Conclusions: The modified Cutler-Beard procedure using an autogenous auricular cartilage graft is an effective procedure for repair of large upper eyelid defects, with acceptable functional and cosmetic results. Furthermore, it is particularly useful in resource-poor areas, due to lower cost than other available options. Keywords: Coloboma, Ptosis, Cutler-Beard Procedure.

Introduction

Repair of full thickness defect created after removal of large tumour is the challenge to the eye surgeon. The goal of the treatment is restoration of normal anatomy, functional and cosmetic appearance of the patient. In addition, the use of a material to restore stability to the upper lid flap is paramount to the functionality of the eyelid. Flaps without tarsal reconstruction have been studied, and such grafts tend to have inadequate stability, with complications such as entropion. Cutler and Beard described the first method of repairing a large upper eyelid defect. Originally introduced in 1955, this procedure involves the creation of an advancement flap from the lower lid that includes skin, orbicularis muscle, and conjunctiva. Notably, the flap excludes tarsal plate, as there is not enough tarsal plate in the lower lid to provide adequate tarsus functionality to both the upper and lower eyelids after the procedure. Some years later, another study highlighted the general importance of recreating the anterior lamellae with use of skin and muscle rather than skin itself, given the need to maintain structure and provide good vascular supply. In addition, the study alluded to the fact that medial forehead and glabellar flaps, when used, provide an inferior skin source to replace delicate eyelid skin.

While the Cutler-Beard procedure represented a major advancement in the treatment of large upper eyelid defects, concerns about complications such as ectropion and lid shrinkage began to arise. Oculoplastic surgeons started to experiment with grafts that included a tissue element to promote more stability to the upper eyelid flap. Allan Putterman described a composite upper eyelid graft using skin from the upper eyelid with the defect, as well as tarsus, conjunctiva, and skin taken from the opposite eyelid. This procedure, however, included the unenviable manipulation and distortion of an intact upper eyelid. Nasal septal cartilage grafts have been used as a tarsal-conjunctival substitute with some success.

The re-distribution of remaining tarsus, whether in the upper or lower eyelid, has been explored as a means of re-establishing stability to an upper eyelid defect. Leone describes a tarsal-conjunctival advancement flap utilizing lower lid tarsus to fill upper lid defects, but the clear disadvantage of possible lower eyelid instability issues persists in this technique. Kersten et al describe the use of a rotational upper eyelid tarsal flap for upper eyelid defects, but this procedure is effective only if the eyelid defect is small enough that adequate tarsus remains for a flap to bridge the defect. Jordan et al described the advancement of a tarsconjunctival flap, but only in cases in which at least 3 mm of central upper eyelid tarsus remains.

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In 1997, Yaqub and Leatherbarrow described a technique of using autogenous auricular cartilage as an upper eyelid tarsal substitute in patients with entropion, with good results. Holloman used Achilles cadaver tendon as a tarsal substitute with successful recreation of the upper eyelid and no complications, but the burden of cost and possibility of disease transmission complicate this technique. In addition, in developed countries, bioengineered tarsal substitutes have been utilized, such as tarSys TM. While there is not yet a plethora of literature evaluating tarSys TM, one recent case report recounts two instances in which a foreign body giant cell reaction to tarSys TM necessitated graft removal. Other surgical options have also been advocated for large upper eyelid defects, including glabellar flaps and Fricke's flaps for anterior lamellae reconstruction, as well as mucous membrane grafts for posterior lamellae replacement. These procedures have significant drawbacks, particularly the utilization of thick skin as an eyelid skin substitute, resulting in poor cosmetics and functionality.

In general, the modified Cutler-Beard procedure has been advocated for repair of large upper eyelid defects, with various materials used to impart stability to the eyelid. Cartilage has been advocated as a tarsal substitute in different situations with success, but has not been studied specifically as a tarsal substitute in combination with a modified Cutler-Beard procedures to correct large upper eyelid defects. In this study, we describe a technique of using autogenous ear cartilage as a means of imparting stability to the traditional Cutler-Beard flap to repair upper eyelid defects greater than 70%.

**Materials and Methods**

This was a prospective, interventional case series of sixteen patients over a period of three years. The study was started from January 2012 in Regional Institute of ophthalmology Medical College Calcutta. Consent was obtained from each patient for surgical procedure.

Inclusion criteria of this study were tumour in the upper eyelid (malignancy confirmed by fine-needle aspiration cytology) and upper eyelid defects of 70-100% after removal of the tumour (Figure 1).

Patients with involvement of local lymph nodes, distant metastasis in the liver, lung or brain, associated lower eyelid involvement, gross corneal infiltration, or intra-orbital extension were excluded.

Six patients were male, and ten patients were female. Patient age ranged from sixty to eighty-six years old. Each patient had an upper eyelid defect created by removal of a large malignant tumour. All investigators adhered to the principles outlined in the Declaration of Helsinki. In addition, the Institutional Ethics Committee at the Medical College of Kolkata approved the study.

Regarding surgical procedure, the upper eyelid tumour was excised, with a minimum of 4 millimeter of gross macroscopic healthy margins horizontally and vertically, leaving a rectangular eyelid defect. This prevents the post operative recurrence of the malignancy. Whatever the tumour size e.g. oval, round, triangular, always make the defect rectangular with cancer free margin. Intraoperative measurement of width and length of created defect expressed in percentage. Defects ranged from 70-100% were considered for the surgery. That was determined by the requirement of auricular cartilage support of tarsal plate replacement. Length of the created defect determined the tarsal plate replacement and width is for how much advancement flap negotiate below the bridge flap. A lower eyelid rectangular flap was then made by making a full-thickness horizontal incision two millimeters below the lower tarsal plate, followed by two vertical full-thickness incisions at the medial and lateral borders of the tarsal plate. The tarsus was dissected from this flap and left to maintain structure in the lower eyelid (Figure 2). This flap was then advanced into the upper lid defect. It was then split into anterior lamellae (skin and orbicularis muscle) and posterior lamellae (conjunctiva and capsulopalpebral ligament). The remaining upper eyelid was then divided into its own anterior lamellae (skin, orbicularis muscle, and orbital septum) and posterior lamellae (conjunctiva and aponeurosis of the Levator Palpebrae Superioris muscle). The posterior lamellae of the flap and upper eyelid were secured together with interrupted 5-0 polyglactine sutures, creating a cartilage bay.

Figure-1 Pre-operative image of sebaceous cell carcinoma involving the entirety of the right upper eyelid.
Figure 2: Plate Steps of operation autogenously auricular cartilage grafted in upper lid replacing tarsal plate by modified Cutler Beard Procedure. 2A & 2b. Tumour mass is excised with 4 mm healthy margin creating a quadrangular defect in upper lid. 2C. Elliptical auricular cartilage excised from the back of the ear pinna.2D. Elliptical auricular cartilage fixed on posterior laminae bay, made of upper lid and lower advancement flap. 2E. Quadrangular upper lid created defect filled up by similar advancement flap where auricular cartilage being sandwiched by anterior lamellae and posterior lamellae of upper and lower advancement flap. 2F. In 2nd stage after two and half month there is opening of the lid with creation of upper lid margin.

A vertical incision was then made in the back of the pinna on the ipsilateral side of the upper eyelid defect, and a wedge of cartilage was removed (Figure-2C). The size of the ear cartilage was measured to appropriately replace the tarsus defect in the upper eyelid. The incision was closed with interrupted 5-0 black silk sutures. The graft was then implanted into the cartilage bay made earlier by attachment of advancement flap posterior lamellae with upper eyelid posterior lamellae, and was secured with 5-0 polyglactine sutures. The anterior lamellae from the advancement flap were then secured to the anterior lamellae of the upper eyelid, sandwiching the autogenous ear cartilage (figure-2E). This bridge flap was maintained for three months. When incised, the bridge flap was maintained with convexity downwards to carefully construct the lid margin, which ideally should be smooth to properly maintain corneal...

Figure 3: Post-operative lid opening and closure of right upper eyelid of patient who underwent modified Cutler-Beard procedure with auricular cartilage graft.
integrity and tear film. The lower lid margin was then smoothened and secured. Each patient was examined and photographed at every postoperative visit, with patients followed from six months to two years post-operatively (Figure 3). Figure 4 showed another case of Total Upper Eyelid Reconstruction with Modified Cutler-Beard Procedure using autogenous auricular cartilage.

Results

Sixteen patients underwent the two stage modified Cutler-Beard procedure with autogenous auricular cartilage in the repair of large upper eyelid defects after tumour resection. In this study, half of the patients had a 100% lid defect, which require total tarsal plate replacement by autogenous auricular cartilage while the other half of patients had a 70-90% lid defect. It was treated with partial replacement of tarsal plate by auricular cartilage. Pre-operative levator palpebrae superioris (LPS) action ranged from 0-4 mm, while post-operative LPS action was 12-14 mm. Pre-operative margin-to-reflex distanced (MRD) ranged from -4 millimeters to -1 mm, while post-operative MRD was +3 to +4 millimeters (Table 1).

The follow-up period ranged from six months to two years. Every patient had a successful upper eyelid reconstruction. There were no infections, wound dehiscence, cartilage exposure, or wound necrosis in any patient. There was no incidence of ectropion, entropion, lid retraction, lid malposition, ptosis, or lid shrinkage.

Table: 1. Patient Lid Measurements

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>Age</th>
<th>Sex</th>
<th>Original Diagnosis</th>
<th>Created defect (mm) (Length + Width)</th>
<th>Pre-Op LPS action (mm)</th>
<th>Post-op LPS action (mm)</th>
<th>Pre-op MRD</th>
<th>Post-op MRD</th>
<th>Follow up in months</th>
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<td>1</td>
<td>75</td>
<td>M</td>
<td>SqCC</td>
<td>30 + 18 30 = 32×100 = 93.7</td>
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<td>-4</td>
<td>+4</td>
<td>24</td>
</tr>
<tr>
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<td>SeCC</td>
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<td>-4</td>
<td>+3.5</td>
<td>18</td>
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<tr>
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<td>-4</td>
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<td>16</td>
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<td>-2</td>
<td>+4</td>
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<tr>
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<td>24</td>
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<td>71</td>
<td>F</td>
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<td>23 + 12 23 = 32×100 = 71.8</td>
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<td>+4</td>
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<tr>
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<td>SeCC</td>
<td>30 + 20 30 = 32×100 = 93.7</td>
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<td>0</td>
<td>13</td>
<td>-4</td>
<td>+4</td>
<td>24</td>
</tr>
</tbody>
</table>

SqCC – Squamous cell carcinoma | SeCC – Sebaceous cell carcinoma | LPS – Levator palpebrae superioris muscle | MRD – Margin to reflex distance

Figure 4: Pre and post operative image of Total Upper Eyelid Reconstruction with Modified Cutler-Beard Procedure using autogenous auricular cartilage
contact lens applied postoperatively in all the patient. All patients initially had ocular surface irritation due to eyelid margin suture; however, by four months, all patients had adequate eyelid function with a healthy ocular surface. None of the patients required a second surgical procedure. The modified Cutler-Beard flap and autogenous auricular cartilage used for tarsal reconstruction retained good architecture, stability, mobility, functionality, and cosmesis through the entirety of the follow-up period.

Discussion

As previously described, there are numerous procedures in the literature discussing the repair of complex upper eyelid defects, all with their respective advantages and drawbacks. However, no studies to date have reported the use of the modified Cutler-Beard procedure with autogenous ear cartilage in the reconstruction of large upper eyelid defects (>70%) after tumor excision. This case series highlights the successful use of this technique in the reconstruction of large, often difficult to repair, upper eyelid defects.

All of the patients did well in this case series following the modified Cutler-Beard procedure using autogenous ear cartilage for tarsal reconstruction. We prefer this procedure due to its unique advantages. The upper eyelid reconstruction provided excellent functionality with good levator function, allowing adequate clearance of the pupil for good vision. Further, none of the patients in the study had resultant upper or lower eyelid entropion, ectropion, lid shrinkage, lid malposition, or ptosis.

A previous study reporting the use of auricular cartilage in the upper eyelid also showed no post-operative complications or additional surgery. This study, however, included graft implantation in the upper eyelid for entropion repair, rather than a Cutler-Beard procedure for eyelid defects. As for cosmetic results, autogenous post-auricular cartilage classically has excellent results. The donor site itself is located in a discreet area, one cannot visualize without manipulation of the ear. The experience of multiple institutions, including both at our own and others throughout the world, highlights the excellent cosmetic results at the donor and recipient site in post-auricular graft usage.

This study is particularly unique in that it was performed in Kolkata, India. In the area with middle to low socioeconomic groups with limited access to donor grafts and expensive synthetic tissue substitutes, the options for repair of very large eyelid defects are few and can be particularly daunting. Achilles tendon grafts cost around $1400, while donor sclera is approximately $650. As for tarSys TM, one 1 cm x 4 cm piece of tarSys TM costs $385. Moreover, aside from cost itself of biologic grafts, one must also consider the increased failure rates of such grafts. For example, in a study of anterior cruciate ligament repair using allografts and autografts, allografts were 7.7 times more likely to fail than autografts. The necessitation of removal of implanted tarSys TM grafts in two cases was previously discussed. Failure rates of allografts and synthetic material simply cannot compare to success rates of autografts. As for tarSys TM, while there is not yet a plethora of literature studying the material, one recent case report recounts two instances in which a foreign body giant cell reaction to Tarsys necessitated graft removal. Failure rates of allografts and synthetic material simply cannot compare to success rates of autografts.

Finally, the challenges of screening donor tissues thoroughly in certain areas of the world further complicate this issue. If using an autograft, there is no chance of transmission of communicable diseases, as there is no donor tissue involved. Screening for donor tissue infection, including hepatitis B, hepatitis C, and HIV, is expensive and less common in the developing world. In one 2005 account of the safety of blood supply in the Caribbean world, of 24 countries, 15 reported universal screening. The only way that these scenarios can be entirely avoided is by use of autograft, rather than donor, tissue when possible. One minor disadvantage of our technique is that there exists a second surgery site, given that the cartilage graft is autogenous. However, as evidenced above, as cartilage is taken from behind the ear and closed in simple fashion, there is an almost non-existent cosmetic or functional defect. Further as evidenced by this and previous studies, there are no significant functional deficits in the donor flap site of the lower eyelid. In certain conditions this procedure is not fruitful, like when the malignancy had distal metastasis or local lymph node involved confirmed by biopsy. The patient having upper lid malignancy may involve the lower lid. In case of lid malignancy may enter into the orbital cavity, surgeon can try but the surgical outcome is not satisfactory.

Conclusion

The modified Cutler-Beard procedure with autogenous ear cartilage for tarsal reconstruction is an acceptable procedure for repair of eyelid defects of 70-100%. In addition to providing satisfactory cosmetic results, it is safe and cost-effective. The procedure’s efficacy, cost-effectiveness and low complication rates can make it advantageous everywhere, whether in countries with unimpeded access to varied tissues options, or in those with infrastructures that limit such availability.
References

Quantitative Reduction in Central Foveal Thickness After First Anti VEGF Injection As A Predictor of Final Outcome in BRVO Patients.

Rupak Roy, Kumar Saurabh, Avirupa Ghose, Dhileesh P Chandrasekharan, Preeti Sharma, Swakshyar Saumya Pal, Sudipta Das

Abstract: Aim: To analyse the predictive ability of quantitative reduction in central foveal thickness after first anti-VEGF injection to assess final outcome in BRVO patients. Design: Retrospective interventional consecutive case series. Setting: Single centre study. Methods: We retrospectively reviewed 60 treatment naïve patients of BRVO. All the patients were treated with injection Bevacizumab on pro re nata basis (PRN). We measured the reduction in central foveal thickness (CFT) 1 month after injection and at each visit with other optical coherence tomography features (OCT) like external limiting membrane (ELM) integrity, IS – OS layer integrity and Foveal bulge (FB). Results: At final follow up more patients in group >25% CFT reduction group had a better mean BCVA and dry macula as compared to group ≤25%. (0.25 logMAR vs 0.46 log MAR p = 0.03, 28 eyes vs 9 eyes p =0.005). Based on the final visual outcome we divided patients into 2 groups i.e Group I: BCVA ≥20/40 and Group II: BCVA < 20/40. Analysis at 1 month after injection revealed ELM was intact in 27 (73%) and 5 (21.7%), IS–OS layer was intact in 28 (75.7%) and 11(47.8%) and FB was intact in 12 (32.4%) and 2 (8.7%) patients respectively in group I and II. (p = 0.001, 0.02 and 0.03). Conclusion: Patients who have more than 25 % reduction after first anti-VEGF injection and a restored ELM, IS –OS layer and FB have significantly higher likelihood of achieving BCVA≥20/40.

Key words: BRVO, OCT Predictors, Quantitative response.

Introduction

Macular oedema (ME) is the major cause of vision loss in eyes with branch retinal vein occlusion (BRVO).¹ Intravitreal bevacizumab (IVB) has been used to treat ME in BRVO eyes and has given promising results.² IVB has been used both in monthly injection regimen and on pro re nata basis (PRN).³,⁴ However certain proportion of BRVO patients do not regain vision even after resolution of ME.⁵,⁶ Various studies have attempted to answer this question and have come up with spectral domain optical coherence tomography (SDOCT) predictors to determine the prognosis of eyes with ME due to BRVO.⁵,⁶ Photoreceptor inner segment – outer segment (IS-OS) layer and external limiting membrane (ELM) has been two such markers whose integrity at the baseline has been associated with better final visual outcome.¹ Foveal bulge (FB) is another novel marker used to predict the visual outcome of BRVO. FB is the site at the base of fovea which has maximum cone density. Its presence after resolution of ME has been associated with better visual outcome in BRVO.⁵

BRVO is an acute event with sudden explosion of intravitreal anti vascular endothelial growth factor (Anti-VEGF). VEGF levels in aqueous humour correlates strongly with degree of ME in BRVO patients.⁶ However in day to day clinical practice it is not possible to measure actual VEGF levels in every patient. Initial quantitative OCT based reduction of Central Foveal Thickness (CFT) in response to Anti-VEGF may provide a clue to the VEGF levels and act as a prognostic indicator.

Response to Anti-VEGF at three months from baseline after monthly injections was examined as predictor of visual outcome in BRVO patients.⁷ Current study evaluated predictive ability of reduction in CFT at 1 month after first injection. Our study aims at utilizing various SDOCT parameters like integrity of IS-OS layer, ELM and FB and combining them with one month reduction in CFT with IVB; to provide a prognostic tool for final visual outcome in eyes with ME due to BRVO.

Material and methods

It was a retrospective review of medical records of consecutive patients with BRVO presenting at a tertiary care centre in eastern India between January 2013 and December 2013. The study was approved by institutional review board and it followed the tenets of Declaration of Helsinki. Treatment naive patients with disease onset within last 3 months were included in the study. Exclusion criteria were: (1) intraocular surgery, including cataract extraction and any intravitreal injection prior to the treatment, (2) laser treatments including pan retinal photocoagulation, posterior capsulotomy, or grid macular photocoagulation, prior to the treatment, or (3) the presence of co-morbid retinal pathologies like diabetic retinopathy and age related macular degeneration.

Age, gender and laterality were noted from the medical records. Best corrected visual acuity (BCVA) was noted with Snellen’s chart and was converted to logMAR scale. Anterior segment examination with slit lamp, fundus examination with indirect ophthalmoscope and slit lamp biomicroscopy were performed at all visits. Optical coherence tomography was performed using Topcon 3D 2000 (Topcon Medical Systems, Oakland NJ) at each visit to assess the response to treatment. Horizontal scans closest to the fovea were evaluated for study purpose. All the scans were evaluated by an
experienced retina specialist (AVG). In case of doubt; opinion was sought from another retina specialist (DPC). Consensus opinion of both specialists were evaluated for study purpose. The CFT was measured as the distance between the internal limiting membrane (ILM) and the outer border of the retinal pigment epithelium (RPE) at the central fovea. The distance was measured manually for each patient. ELM was identified as the hyper reflective band after outer nuclear layer. A second hyper reflective band after ELM representing interface between inner and outer segments of photoreceptors was designated as IS-OS junction. The photoreceptor IS/OS layer and ELM were evaluated at the foveal centre on each OCT image. Any discontinuity in the line corresponding to the photoreceptor IS/OS junction and/or ELM were evaluated. Other OCT features like subretinal fluid (SRF), cystoid macular oedema (CME), diffuse retinal thickening (DRT), and epiretinal membrane (ERM) were also evaluated. The IS-OS layer was also evaluated to look for bulge at the center of fovea, the Foveal Bulge (FB). The eyes were classified into those with a foveal bulge and those without a foveal bulge. OCT was done at each visit and at each visit all these parameters were evaluated. Figure 1 illustrates the three evaluated parameters i.e ELM, IS–OS layer and FB.

**Results**

We evaluated 60 eyes of 60 patients of BRVO. All patients had unilateral BRVO. Baseline demographic and OCT features are enumerated in Table 1. Forty four of our patients were male whereas 16 were female. The average ages of patients were 56 ± 11.51 years. Mean BCVA at presentation was 0.50 logMAR units and the mean final BCVA was 0.32 logMAR units. There was significant improvement in BCVA post treatment (p= 0.01 paired t test). Mean CFT at baseline was 597 microns and the mean final CFT was 290 microns. This difference was significant (p= 0.01 paired t test). Mean number of injections given to each patient was 2.25 ± 1.09. Adjuvant rescue macular laser was done in 9 (15%) eyes. At presentation 27 (45%) patients had CME with SRF, 23 (38.3%) had CME, two (3.3%) had SRF only, six (10%) had diffuse retinal thickening and two (3.3 %) had ERM. No treatment related complications like endophthalmitis or retinal detachment was noted in the study eyes.

Primary goal of the study was to find the predictive ability of the quantitative response after the first anti-VEGF injection with respect to the final outcome. Patients were divided into 2 groups based on OCT measured reduction in CFT after first injection (Group A: ≤ 25% reduction and Group B: >25% reduction). There were 27 patients in Group A (45%) and 33 patients in Group B (55%).

**Table 1** Baseline demographic and Optical Coherence Tomographic characteristics of patients in this study

<table>
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<th>Age, Years (mean ± SD)</th>
<th>56 ± 11.51</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (male/female)</td>
<td>44/16</td>
</tr>
<tr>
<td>OD/OS</td>
<td>36/24</td>
</tr>
<tr>
<td>Mean follow up duration(months)</td>
<td>15.8 ± 10.82</td>
</tr>
<tr>
<td>DM/HTN</td>
<td>34/10</td>
</tr>
<tr>
<td>Number of injections</td>
<td>2.25 ± 1.09</td>
</tr>
<tr>
<td>CME (n) %</td>
<td>23(38.3)</td>
</tr>
<tr>
<td>NSD (n) %</td>
<td>2(3.3)</td>
</tr>
<tr>
<td>CME + NSD (n) %</td>
<td>27(45)</td>
</tr>
<tr>
<td>DRT (n) %</td>
<td>6(10)</td>
</tr>
<tr>
<td>ERM (n) %</td>
<td>2(3.3)</td>
</tr>
<tr>
<td>Baseline BCVA</td>
<td>0.50 ± 0.30</td>
</tr>
<tr>
<td>Final BCVA</td>
<td>0.32 ± 0.32</td>
</tr>
<tr>
<td>Baseline CFT (µm)</td>
<td>597.83 ± 190.20</td>
</tr>
<tr>
<td>Final CFT (µm)</td>
<td>290.35 ± 144.83</td>
</tr>
</tbody>
</table>

SD= standard deviation; DM= diabetes mellitus; HTN= hypertension; CME= cystoid macular edema; NSD= neurosensory detachment; DRT= diffuse retinal thickening; ERM= epiretinal membrane; BCVA= best corrected visual acuity in logMAR; CFT= central foveal thickness.
23 (38.3%) and 37 (61.6%) patients respectively in group A and B respectively. Clinical characteristics of patients in these two groups are enumerated in Table 2. There was no significant difference between these groups in terms of presenting age, duration of follow up, number of injections, initial BCVA, initial CFT. At final follow up patients in group B had a significantly better mean BCVA as compared to the group A. (0.25 logMAR vs 0.46 log MAR p = 0.03, t test). There was significantly more number of patients in group B who achieved a dry macula at final follow up as compared to group A. (28 patients vs 9 patients p =0.005 t test). Similarly significantly more number of patients in group B achieved BCVA≥20/40 at final follow up as compared to group A. (28 patients vs 9 patients p =0.005 t test).

Based on the final visual outcome we divided patients into 2 groups i.e Group I: BCVA ≥20/40 and Group II: BCVA less than 20/40.

We had 37 (61.6%) patients in Group I and 23 (38.3%) patients Group II. Clinical characteristics of patients in these two groups are enumerated in Table 3. Demographic data and OCT microstructural data was compared between two groups at first visit, 1 month after first injection and at final follow up. There was no significant difference in presenting age, follow up duration, mean presenting BCVA, mean presenting CFT and mean number of injections amongst these two groups. Analysis of OCT data at initial visit revealed that ELM was intact in 12 (32.4%) and 6 (26.1%) patients in Group I and II respectively. The difference was not significant. In rest of the patients in either group ELM was not seen or was not intact. Similarly at initial visit IS – OS layer was intact in 11 (29.7%), and 9 (39.1%) patients respectively in group I and II. Foveal Bulge was intact in 2 (5.4%) and none patients respectively in Group I and II. The difference was not significant for both ELM and IS –OS. In rest of the patients in either group IS –OS layer and FB was not seen or was not intact. Patient's clinical details including OCT data was reviewed 1 month after first injection. In this visit ELM was intact in 27 (73%) and 5 (21.7%) patients in group I and II respectively. The difference was significant. (p = 0.001 chi square test).

IS –OS layer was intact in 28 (75.7%) and 11 (47.8%) patients respectively in group I and II. This difference was significant. (p = 0.02, chi square test) FB was intact in 12 (32.4%) and 2 (8.7%) patients respectively in group I and II. This difference was significant. (p = 0.03, chi square test.) At final visit ELM was intact in 24 (64.8%) and 8 (34.7%) patients in group I and II respectively. The difference was significant. (p = 0.02 chi square test). Similarly IS –OS was intact in 25 (67.5%) and 9 (39.1%) patients respectively in group I and II. The difference was significant. (p = 0.03, chi square test). FB was intact in 15 (40.5%) and 1 (4.3%) patients in group I and II respectively. The difference was significant. (p = 0.002 chi square test).

**Table 2: Comparison of patients with or without best corrected visual acuity of ≥ 20/40 at final follow up**

<table>
<thead>
<tr>
<th></th>
<th>Group I</th>
<th>Group II</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>n (%)</td>
<td>37 (61.6)</td>
<td>23 (38.3)</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>55.72 ± 13.13</td>
<td>59.82 ± 7.01</td>
<td>0.05</td>
</tr>
<tr>
<td>Follow up period (mean ± SD)</td>
<td>18.83 ± 11.96</td>
<td>14.91 ± 6.25</td>
<td>0.06</td>
</tr>
<tr>
<td>Number of injection</td>
<td>2.40 ± 0.98</td>
<td>2.0 ± 1.24</td>
<td>0.77</td>
</tr>
<tr>
<td>Initial examination</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LogMAR</td>
<td>0.41 ± 0.24</td>
<td>0.64 ± 0.34</td>
<td>0.14</td>
</tr>
<tr>
<td>CFT (µm)</td>
<td>614.24 ± 166</td>
<td>571.78 ± 185.19</td>
<td>0.15</td>
</tr>
<tr>
<td>ELM intact (n, %)</td>
<td>12 (32.4)</td>
<td>6 (26.1)</td>
<td>0.77</td>
</tr>
<tr>
<td>Detection of foveal bulge (n, %)</td>
<td>2 (5.4)</td>
<td>0</td>
<td>0.51</td>
</tr>
<tr>
<td>IS - OS layer intact (n, %)</td>
<td>11 (29.7)</td>
<td>9 (39.1)</td>
<td>0.3</td>
</tr>
<tr>
<td>1 month post injection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFT (µm)</td>
<td>482.16 ± 175.86</td>
<td>536.91 ± 210.88</td>
<td>0.17</td>
</tr>
<tr>
<td>ELM intact (n, %)</td>
<td>27 (73)</td>
<td>5 (21.7)</td>
<td>0.001</td>
</tr>
<tr>
<td>Detection of foveal bulge (n, %)</td>
<td>12 (32.4)</td>
<td>2 (8.7)</td>
<td>0.03</td>
</tr>
<tr>
<td>IS - OS layer intact (n, %)</td>
<td>28 (75.7)</td>
<td>11 (47.8)</td>
<td>0.02</td>
</tr>
<tr>
<td>Final Visit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELM intact n (%)</td>
<td>24(64.8)</td>
<td>8(34.7%)</td>
<td>0.02</td>
</tr>
<tr>
<td>Detection of foveal bulge (n, %)</td>
<td>15 (40.5)</td>
<td>1 (4.3)</td>
<td>0.002</td>
</tr>
<tr>
<td>IS - OS layer intact (n, %)</td>
<td>25 (67.5)</td>
<td>9 (39.1)</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Group I: BCVA ≥20/40, Group II: BCVA< 20/40; BCVA = best corrected visual acuity in log MAR; CFT = central foveal thickness; ELM = external limiting membrane

**Discussion**

Intravitreal Bevacizumab (IVB) has been noted to be effective in the management of ME due to BRVO in both monthly injection and PRN injection schedule. However resolution of ME does not invariably lead to improvement of vision in these eyes. Various SDOCT parameters have been studied to predict the resolution of ME and improvement of vision in BRVO patients. Intact ELM and IS-OS layer and presence of FB at final follow up are considered to be predictors of resolution of ME and better visual outcome. However there remains a possibility of non-visualization of these
structures at the first visit in BRVO eyes due to overlying retinal haemorrhages.\(^1\) Our study has noted the integrity of these SDOCT structures at baseline and at one month after first IVB injection, when retinal haemorrhages start to clear over the foveal region. In addition our study also tried to find out a correlation between response to first IVB injection in terms of percent reduction in CFT and resolution of ME and visual outcome at final visit.

In our patients with BRVO, intact ELM and IS-Os layer at baseline did not predict resolution of ME at final follow up. They did not either predict a better visual outcome in these eyes. This is in contrast to study by Kang et al who report that intact IS-Os and ELM at baseline were predictors of good visual outcome, in that order.\(^1\) Further we have noted that when assessed at one month after IVB; intact ELM, IS – OS layer and FB was a predictor of resolution of ME and better visual outcome at final follow up.

The exact mechanism of disruption of ELM and IS-Os layer are still unknown.\(^8\) What our study adds here is that looking for these SDOCT parameters at one month after first IVB injection, when haemorrhages start to clear may show a different result than that noted at baseline. The difference in the predictive ability of ELM and IS-Os layer at baseline and at one month after IVB injection stems from the fact that acute photoreceptor swelling or damage and overlying haemorrhage at baseline may influence the interpretation of these SDOCT features.\(^4,9\) Studies have reported a definite role of Anti-VEGF injections in clearing of retinal haemorrhages in patients with BRVO.\(^4\) Therefore if we look for these structures in follow up when the photoreceptor swelling and haemorrhage start to resolve we may achieve a better prognostic value of these SDOCT parameters.\(^3\) Kang et al have mentioned that eight of their patients with BRVO were excluded from the study due to non-visualization of ELM and IS-Os layer at baseline. They acknowledge that in such a scenario follow up SDOCT after intravitreal Anti-VEGF will help in identifying these structures and prove their prognostic significance.\(^1\) Our study has attempted to answer the same question. There has been a recent interest on the prognostic significance of FB, a novel OCT feature. Studies have reported its prognosticating ability in various conditions like BRVO, retinal detachment and amblyopia.\(^5,9,10\) Hasegawa et al has reported that eyes with BRVO with intact FB after resolution of ME have better visual acuity outcomes\(^5\). An intact FB at final follow-up was noted to be significantly associated with dry macula and better visual outcome. Our finding is in keeping with that of Hasegawa et al.\(^3\) But interestingly we noted the significance of FB visualisation at 1 month post anti-VEGF injection as a good prognostic factor also. A key focus of this study was the correlation between the quantitative reductions of CFT at 1 month after first anti-VEGF injection with the final outcome. Extent of reduction in the CFT at one month after IVB injection has not been correlated with resolution of ME and visual outcome in past.

### Table 3: Comparison of patients having ≤ 25% versus > 25% reduction in central foveal thickness 1 month after first anti VEGF injection

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>n (%)</td>
<td>23 (38.3)</td>
<td>37 (61.6)</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>56.5 ± 8.15</td>
<td>55.7 ± 13.28</td>
<td>0.07</td>
</tr>
<tr>
<td>Follow up period</td>
<td>17.08 ±11.20</td>
<td>15.0 ± 10.65</td>
<td>0.45</td>
</tr>
<tr>
<td>Number of injection</td>
<td>2.43 ± 1.34</td>
<td>2.13 ± 0.91</td>
<td>0.09</td>
</tr>
<tr>
<td>At presentation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCVA</td>
<td>0.479 ± 0.27</td>
<td>0.51 ± 0.32</td>
<td>0.07</td>
</tr>
<tr>
<td>CFT (µm)</td>
<td>453.34 ± 175.04</td>
<td>534.10 ± 194.92</td>
<td>0.36</td>
</tr>
<tr>
<td>Final visit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCVA</td>
<td>0.46 ± 0.37</td>
<td>0.25 ± 0.26</td>
<td>0.03</td>
</tr>
<tr>
<td>BCVA status n(%)</td>
<td>9 (39.1)</td>
<td>28 (75.7)</td>
<td>0.005</td>
</tr>
<tr>
<td>(Vision ≥ 20/40)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macular status (dry)</td>
<td>9 (39.1)</td>
<td>28 (75.7)</td>
<td>0.005</td>
</tr>
<tr>
<td>n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Group A = ≤ 25% reduction in cft; Group B = > 25 % reduction in CFT SD= standard deviation; CFT= central foveal thickness in microns ; BCVA= best corrected visual acuity in logMar

Post hoc analysis of Treatment of Macular Edema following Branch Retinal Vein Occlusion: Evaluation of Efficacy and Safety (BRAVO) and Treatment of Macular Edema following Central Retinal Vein Occlusion: Evaluation of Efficacy and Safety (CRUISE) studies has correlated the reduction in CFT with the visual outcome in BRVO and CRVO respectively.\(^6,7,11\) This study has analyzed the time domain OCT images at baseline and at three months after three monthly injections of Ranibizumab.\(^7\) They have classified the eyes with CFT 250 micron or less at three months as early responders. Early responders among CRVO eyes had better visual outcome at final follow-up than remaining eyes. Among BRVO eyes early responders had significantly better visual outcome only at three months. We have found that eyes which had more than 25 % reduction in CFT at one month after first IVB injection were more likely to have dry macula and better visual outcome at final follow up, than eyes which had ≤25 % reduction in CFT. We did not keep a specific CFT value as cut off for comparison, keeping in mind the fact that different eyes may have different CFT at baseline, depending upon the severity of ME at presentation and vascular endothelial growth factor (VEGF) load. Our study suggests that response to first IVB injection measured at one month interval has a predictive ability for resolution of ME and visual outcome in eyes with BRVO. In day to day clinical
practice there is trend towards PRN treatment because intensive monthly injections are costly and compliance is poor. Studies have shown similar outcomes in both groups. Prognostic indicators might help in stratifying patients into groups requiring intensive or PRN treatment. Our study indicates patients having more than 25% reduction after first injection might be good candidate for PRN treatment whereas patients having less than 25% reduction might need intensive treatment from the beginning.

Our study has few limitations. It was a retrospective, noncomparative case series with limited number of subjects. To conclusively prove that extent of CFT reduction was a strong predictor of visual outcome in BRVO patients it should be studied in a prospective design. However our study is first such report of the extent of CFT reduction at one month as a parameter to predict outcome of BRVO. Similarly present study has for the first time assessed the prognostic role of ELM, IS-OS layer and FB at one month after first IVB injection in BRVO patient.

The finding that integrity of ELM, IS – OS layer and FB at one month after IVB injection were predictors of better visual outcome would help understand the value of SDOCT parameters better in BRVO patients. Role of CFT reduction after first IVB injection as predictor of visual outcome will help clinicians in better prognostication of BRVO eyes.

References

Capsulorhexis Simplified for Beginners

Asmita Ray, R. C. Paul

Abstract: To study the efficacy of Rhexis Ring Calliper (VERUS Ring) in aiding capsulorhexis. A non-randomised hospital based study was conducted on 30 full dilated eyes with cataract using a silicone made, disposable, capsulorhexis ring calliper, having an inner diameter of 5 mm, along with dispersive OVDs. Rhexis with proper centration and sizing of 5 mm was made effortlessly in all the eyes without any complications by all the surgeons, particularly the first year residents. Verus ring is an unique and cost effective innovation in the field of cataract surgery in achieving perfect size and centration of capsulorhexis, thereby making one of the toughest steps of cataract surgery a cake walk for new surgeons.

Key words: Verus ring, user friendly, perfect size & centration, reproducible, capsulorhexis.

Introduction
Capsulorhexis is one of the most crucial steps for better outcome of cataract surgery. Since its inception capsulorhexis has seen numerous ways of getting itself created. There are various methods of doing capsulorhexis which include doing it manually, using callipers, rulers or by using femtosecond laser.

Manual method, callipers, rulers and femtosecond lasers have their own shortcomings like steep learning curve, decentration while doing rhexis or being a costly affair.

To overcome all these difficulties there comes a very easy and innovative way which is by using Rhexis Ring Calliper, also known as the VERUS Ring. This ring has been developed by Malik Y. Kahook, MD, of Miles Ophthalmics, Denver.

Purpose of the Study
The main purpose of the study is to understand and analyse the efficacy of Rhexis Ring Calliper (Verus Ring) in aiding capsulorhexis, especially in surgeons who are novice in terms of centrality, accuracy, sizing, reproducibility and also in preventing complications while doing rhexis.

Materials and Methods
It was a non-randomised hospital based study conducted in a tertiary eye care centre in Kolkata. The study was conducted on 30 fully dilated eyes having cataract.

The main material used was the Rhexis Ring calliper or Verus Ring. Verus Ring is a disposable, medical-grade silicone made circular ring. It has an inner diameter of 5 mm. The device is designed with enough surface area between the inside and outside diameter so that there is a significant amount of surface in contact with the anterior capsule. The bottom part of the ring is micro-patterned to provide more stability once the ring is placed on the anterior capsule. As a result, despite the creation of a capsulorhexis along the internal diameter of the device, there is minimal movement relative to the capsule, which allows for precise capsulorhexis.

Along with this ring ample amount of dispersive ocular viscoelastic device (OVD) was also used.

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**Procedure**

The entire steps of the procedure is summarised as below:

**STEP 1**: After placing dispersive OVD in the anterior chamber, Verus ring is introduced in anterior chamber with a Y pusher.

**STEP 2**: It is centered over the anterior capsule and dispersive OVD is used again to settle and stabilize the ring over the capsule.

**STEP 3**: Rhexis is initiated with a forcep in the central part of the capsule.

**STEP 4**: Rhexis margin is then lifted up and torn along the internal edge of the Verus device, lifting it up, preferably at 90 degree, all along while tearing.

**STEP 5**: After completion, ring is removed from the eye.
**Result**

Rhexis with proper centration and sizing of 5 mm was made easily in all the eyes particularly by the beginners.

It was accurate, reproducible and predictable in all the cases.

No complications, which are generally encountered while doing capsulorhexis like rhexis run down was seen, even in novice surgeons.

Femtosecond laser though effective, is a very costly affair. It cannot be used in all set-ups. Centration of the rhexis with femtosecond laser must be done prior to visualization under the operating microscope which is not ideal since anatomy is not as clear under the femtosecond system view. Besides Femtosecond capsulorhexis relies on a 'can-opener' technique in which multiple perforations are connected thus making it weak compared to a continuous curvilinear capsulorhexis.

Lastly the Verus ring has been found to be very useful in case of intumescent cataract in preventing the dreaded complication of Argentinian Flag Sign.

**Discussion**

Capsulorhexis is an extremely difficult skill to master and takes a lot of time and finesse to achieve consistency. Even seasoned physicians who have done thousands of capsulorhexis procedures are frequently off target on centration and sizing.

In case of novice cataract surgeons it is one of the most toughest steps to master.

Manual rhexis thus has a very steep learning curve, often producing improper shape and size. With Verus ring however this learning curve becomes very easy. Moreover it is very efficient and user friendly.

Devices like callipers which are used on corneal surface suffer from corneal refractive index and also cannot be used on irregular corneas. The Verus ring on the other hand produces a precise capsulorhexis.

Rulers introduced in the anterior chamber often result in eccentric rhexis, specially in beginners. But with Verus, a round and regular capsulorhexis can be achieved by a beginner.

**Conclusion**

Verus ring is a unique and cost effective innovation in the field of cataract surgery in achieving perfect size and centration of
capsulorhexis which is also reproducible. Verus ring or Rhexis Ring Calliper thus makes one of the most crucial steps of cataract surgery a cake walk for new surgeons.

References


Rapid Assessment of Avoidable Blindness in North 24 Paraganas: Report

Srivastava A, Sil A K, Bhattacharyya S, Deepankar

Abstract: AIM: To assess blindness in population, its cause and the prevailing modes of treatment using the rapid assessment of avoidable blindness (RAAB) methodology. Materials and Methods: The study was conducted using the rapid assessment of avoidable blindness (RAAB) survey form. The duration of the study was from December 2014 to February 2015. The selection and estimation of population and cluster was done using latest census data and the RAAB 6 software. Door to door survey was done in population above 50 years of age who were examined for visual acuity, slit lamp examination, and both direct and indirect ophthalmoscopy after dilatation. Patients unavailable, not capable or refused examination were also included and their detailed history recorded from statements made by close family members. The data was collected, categorized and analyzed. Results: Out of 3768 people examined, 33% had impaired vision of which 86% had a treatable cause, cataract (53%) being the commonest.11% eyes had undergone cataract surgery. Conclusion: Cataract and refractive errors still persist as the major cause of avoidable blindness especially in peripheral areas which implicates the importance of increase in basic ophthalmological healthcare outreach programmes.

Introduction

World Health Organization (WHO) defined blindness as presenting visual acuity (VA) less than 3/60 in the better eye and visual impairment as VA less than 6/18 but at least 3/60 in the better eye. Based on these criteria, it is estimated that worldwide, 285 million people are visually impaired: 39 million are blind and 246 have low vision. Moreover, 80% of all visual impairment can be avoided or cured and over 90% of those visually impaired live in developing countries like India. In 1999, the World Health Organization (WHO) and the International Agency for the Prevention of Blindness (IAPB) launched the global initiative known as “VISION 2020: the Right to Sight,” which aims to eliminate avoidable blindness by the year 2020. India became the first nation to initiate a public funded program for the prevention of blindness as a national priority health problem. For effective implementation and monitoring of such programs, Population-based surveys are the main source of information. Large scale surveys are expensive and time consuming.

As more than 80% of all blindness occurs in people ≥ 50 years old, Rapid assessment of avoidable blindness (RAAB) survey is a cheap, easy and rapid method of getting population-based data on prevalence and causes of blindness. RAAB is also helpful for monitoring programs at the unit/district level. Numerous RAAB studies have been conducted in many countries around the world.

North 24 Paraganas is the most populated district in the whole of India. It is also the tenth-largest district in West Bengal by area. According to the 2011 census North 24 Paraganas district has a population of 10,082,852 and a population density of 2,463 per square kilometer with a sex ratio of 949 females for every 1000 males.

Sample size calculation

Total sample size was 4080 individuals, 60 each in 68 clusters. Sample size estimation and cluster selection was done by the RAAB 6 software.

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This article has been honoured Smt Satya Rani Hajra Memorial Award 2015
In each cluster, the survey team visited each household accompanied by local health worker to facilitate compliance. The people in the selected cluster were briefed about the survey 2–3 days in advance by the local health worker along with the Public Relations Officer of the team. Informed consent was taken from the head of the family of eligible participant. All the examinations were conducted in the respective household. If an eligible person was not available during the survey, at least two more attempts were made to assess information. If after repeated visits, examination could not be done, information of his visual status was obtained from his relatives or neighbours.

**Ophthalmic examination**

Standard RAAB format was used for collecting information and for eye examination. The survey form consisted of general information; vision and pin hole examination; lens status; principal cause of visual impairment; history if not examined; and barriers to uptake of cataract surgery and details of cataract surgery if operated. Visual acuity (VA) was measured using a tumbling Snellen-E/C chart using optotype size 6/12, 6/18 and 6/60, in full daylight with available correction. Ocular examination and lens status was assessed by an ophthalmologist using portable slit lamp. If presenting vision was <6/18, then pupil was dilated and ophthalmoscopy done to assess the cause of blindness.

**Training**

Three teams received training from an experienced RAAB trainer. The inter-observer agreement between the teams was assessed and found to be good.

**Statistical analysis**

Double data entry and analysis was done using the RAAB 6 software. To check for errors made during data entry of the survey record forms, the data were entered twice by different persons and then compared. Any mismatch was corrected at the level of data entry itself.

**Results**

45% males were between the age 50-59 years

54% females were between the age 50-59 years

Visual impairment
21.5% eyes had cataract and vision < 6/12

45% cause of post surgical visual acuity <6/12 were surgical complications and refractive error

Blindness prevalence (Va<3/60 In Better Eye) by age group

Main cause of blindness which gave a prevalence of 3.6%. Our data was however somewhat close to the APEDS data of 1.84%.

This survey of blindness in the North 24 Paraganas found a lower prevalence of blindness than expected based on current estimates for other parts of India. Despite the low prevalence, most of the cases of blindness and visual impairment were avoidable, suggesting that the prevalence can be reduced furthermore. The relatively higher prevalence of cataract blindness may be partly attributable to the lower cataract surgical coverage. This is due to some barriers for surgery like lack of awareness(47%) and fear of surgery(25%). However, in underdeveloped counties like Nigeria cost is the major hurdle(61%).

The relatively poor outcome after cataract surgery is of concern. Post-op visual acuity of 6/18 or better in our study was 72% compared to the WHO target of 85%. Better training of increased number of
ophthalmologists supplemented with modern equipments would improve cataract surgery both quantitatively and qualitatively.

In our study, almost 85% of blindness was avoidable. Untreated cataract still continues to be the major cause of blindness and refractive error being the second leading cause. Low cost spectacle availability at the periphery would further lower down the cases of avoidable blindness.

**Conclusion**

As people now live longer, the number of people with cataract is anticipated to grow. Even after cataract surgery it was found that the cause of decreased vision was either surgical complication or refractive error. Blindness prevalence was more in females and higher age group. This emphasizes the need for skill development both in terms of more number of cataract surgeons as well as optometrists. This would bring down the barriers like fear of surgery and increase awareness for surgery and refractive error correction to have better vision and hence better quality of life.

**References**


Long Term Outcome of Ahmed Glaucoma Valve Implantation in Paediatric Glaucoma

Maneesh Singh, Lav Kochgaway, Sagar Bhargav

Purpose
The study was designed to evaluate the long term success and complications of Ahmed Glaucoma valve implantation in paediatric eyes.

Methods: 21 eyes of 20 paediatric glaucoma patients who had undergone Ahmed Glaucoma valve implantation and had minimum follow up of 3 years were retrospectively evaluated for surgical success and complications. Success was defined as IOP between 6 to 21 mmHg with (Qualified) or without (Complete) medication. Any data regarding age, specific glaucoma diagnosis, surgical complication, IOP and best corrected vision before and after surgery was analyzed.

Results: Aphakic/ pseudophakic glaucoma(8/21 cases) was the most common type of glaucoma followed by A-R Anomaly (5/21 cases). At 3 years complete surgical success was achieved in 6/21 (28.5%) patients while 10 patients required additional medical therapy to control IOP(Qualified Success= 76%). One patient required repeat valve implantation while 4 patients required Cyclocryo or Diode CPC for better IOP control.

A total of 11 patients had some complication but none of which affected the vision of the patients. The most common complication encountered was tenon cyst (3/21), one of which required bleb needling. Plate erosion and tube extrusion was seen in 2 cases each requiring resurgery. Hypotony with choroidal detachment was seen in 1 case and was managed conservatively. Tube corneal touch was seen in 1 case and was managed surgically while late localized corneal decompensation was noted in 2 cases, none of which affected the best corrected vision and were managed conservatively.

Conclusion: Ahmed Glaucoma valve implantation is a safe surgery for paediatric glaucoma with long term surgical success of 76% by 3 years, however a majority (>50%) of patients do require glaucoma medication by 3 yrs.

Table 1: Patient Demographics

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>No of Eyes</td>
<td>21</td>
</tr>
<tr>
<td>No of Patients</td>
<td>20</td>
</tr>
<tr>
<td>M: F</td>
<td>12: 8</td>
</tr>
<tr>
<td>Age of Insertion of AGV</td>
<td>98 months 36-164 months</td>
</tr>
<tr>
<td>Mean</td>
<td>98 months 36-164 months</td>
</tr>
<tr>
<td>Range</td>
<td>98 months 36-164 months</td>
</tr>
<tr>
<td>Mean IOP preop</td>
<td>30.4 mmHg (SD: 10.7mmHg)</td>
</tr>
<tr>
<td>Reduction of IOP (3 yr)</td>
<td>16.5 mmHg 7-22 mmHg</td>
</tr>
<tr>
<td>Mean</td>
<td>16.5 mmHg 7-22 mmHg</td>
</tr>
<tr>
<td>Range</td>
<td>16.5 mmHg 7-22 mmHg</td>
</tr>
<tr>
<td>DIAGNOSIS (TYPE OF GLAUCOMA)</td>
<td>NO. OF EYES</td>
</tr>
<tr>
<td>Aphakic/ Pseudophakic</td>
<td>8</td>
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<tr>
<td>Axenfield Anomaly</td>
<td>5</td>
</tr>
<tr>
<td>Failed Trabeculectomy/Trabeculotomy (Developmental Glaucoma)</td>
<td>4</td>
</tr>
<tr>
<td>Aniridia</td>
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</tr>
<tr>
<td>Sturge Weber Syndrome</td>
<td>1</td>
</tr>
<tr>
<td>Traumatic</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2: Complications

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Tenon Cyst</td>
<td>3</td>
</tr>
<tr>
<td>Tube erosion</td>
<td>2</td>
</tr>
<tr>
<td>Plate Erosion(Valve Removal)</td>
<td>2</td>
</tr>
<tr>
<td>Late corneal Decompensation</td>
<td>2</td>
</tr>
<tr>
<td>Hypotony with choroidal Detachment</td>
<td>1</td>
</tr>
<tr>
<td>Tube corneal touch</td>
<td>1</td>
</tr>
</tbody>
</table>

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This article has been honoured Dr Anadi Bhusan Basu Memorial Award 2015
Paediatric Cataract – In Pursuit of the Perfect Posterior Capsulorhexis.

Debarpita Chaudhury, Mrinmoy Das, Arijit Mitra

Management of posterior capsule and anterior vitreous is a challenging and controversial area. The use of 3.5 - 4 millimeter (mm) Primary posterior capsulorhexis (PCCC) and anterior vitrectomy has been advocated to prevent posterior capsular opacification (PCO) in children less than 6 years. However, achieving an optimal size of PCCC is technically challenging as the posterior capsule is thinner and less visible than the anterior capsule.

PCCC can be achieved in several ways. The two most accepted techniques are manual PCCC and Vitrectorhexis. Traditionally, forceps have been used to perform the manual PCCC. However it has a long learning curve and achieving the appropriate sized opening still remains a challenge. On the other hand vitrectorhexis is a relatively new technique which has a much shorter learning curve and reduces surgical time but there is paucity of published long term data regarding its predictability and safety.

The initial steps of surgery till cortical aspiration are same for both the rhexis techniques – Manual and Vitrectorhexis.

While performing manual PCCC, the anterior chamber is filled with viscoelastics, taking care that the surface of the posterior capsule is made more or less flat. If the shape of the posterior capsule is too concave it would make it difficult to properly visualize the PCCC edge. After an initial nick in the centre of the posterior capsule, high molecular weight ocular viscosurgical device like sodium hyaluronate 1% is injected in the Berger’s space between the posterior capsule and the anterior vitreous phase. This prevents entanglement of the vitreous fibres in the capsular forceps if there is a disturbance in anterior vitreous phase. This prevents entanglement of the vitreous fibres in the capsular forceps if there is a disturbance in anterior vitreous phase. The leading edge of the PCCC is gripped and regripped with an aim to achieve a PCCC diameter of about 3.5 - 4 mm (Fig. 1). After completing the PCCC anterior vitrectomy is done with settings of 1200 - 1400 cuts per minute and aspiration of 150 mmHg. The end point of vitrectomy is ascertained when the posterior capsule remnant falls back with a smooth margin. After a good anterior vitrectomy, the IOL is implanted in the bag. Usually a single piece acrylic hydrophobic IOL is used in most of the cases after manual PCCC due to the ease of insertion and manipulation in the bag.

In cases where vitrectorhexis is performed, the IOL is first implanted in the bag. A single piece acrylic hydrophobic IOL or a multipiece acrylic hydrophobic IOL is implanted before proceeding with vitrectorhexis. The IOL is implanted before proceeding with the rhexis with the help of a vitrector with the presumption that the rhexis margin would be ragged, thereby risking posterior rhexis extension during IOL implantation. The vitrector is then introduced behind the IOL optic with port down and the irrigation cannula is kept in the anterior chamber. The settings of vitrectomy are a cut rate of 1200 - 1400 per minute and aspiration of 100- 150 mmHg. Once the opening is made in the posterior capsule, the port is turned anterior so that the enlargement can be done under visualization (Fig.2). Once an appropriate sized posterior rhexis is achieved, anterior vitrectomy is done by moving the vitrector in the centre of the opening. Then with the cutter off, the instrument is gently brought back into the anterior chamber and the IOL optic manipulated back into the bag. The instruments are then withdrawn from the eye and side ports and main port are hydrated.

This procedure of vitrectorhexis is preferred over pars plana vitrectomy with vitrectorhexis by paediatric ophthalmologists since they are mostly trained anterior segment surgeons who do not perform pars plana vitrectomy on a regular basis. Moreover, this technique would avoid additional three incisions in the eye to achieve a similar result.

The term Vitrectorhexis was first used by Wilson et al in 1999. However despite the technique being used sporadically, it did not gain much popularity. In 2007, Wilson and colleagues found out that vitrectorhexis was well suited for use in children less than 6 years of age due to their highly elastic anterior lens capsule. In 2009, Hazirolan and colleagues published an article titled: Vitrectorhexis versus forceps capsulorhexis for anterior and posterior capsulotomy in congenital cataract surgery. Twenty-eight eyes with congenital cataract were included in the study. The anterior and posterior continuous curvilinear capsulorhexes were created using
that manual rhexis remains the gold standard. The authors however revealed a more smooth, regular edge. They therefore reiterated greater resistance to capsule tearing than the vitrectorhexis and also paediatric cataract. The authors concluded that manual CCC offered curvilinear capsulorhexis and vitrectorhexis in an animal model of scanning electron microscopic appearance of manual continuous curvilinear capsulorhexis in paediatric cataract surgery. Fifty eyes with congenital and developmental cataract were included in this study. The posterior capsulorhexis was created using Utrata forceps in 17 eyes or through a vitrector in 33 eyes. Forceps capsulorhexis was performed before IOL implantation, while vitrectorhexis was performed after IOL implantation in the bag. The results of both the surgery were compared using the following criteria: incidence of extension of rhexis, ability to implant the IOL in the bag, the surgical time, and learning curve. The authors concluded that Vitrectorhexis after IOL implantation was an easy to learn alternative to manual posterior continuous curvilinear capsulorhexis in paediatric cataract surgery. It was more predictable and reproducible, with a short learning curve and lesser surgical time. The limitations of the study done by Kochgaway et al were a small sample size, lack of randomization of the sample and unequal size of the samples. The number of patients who underwent vitrectorhexis was deliberately kept larger as the surgeon wanted to study the learning curve of a new procedure that he was trying. The long term results of this relatively new technique of vitrectorhexis are yet to be seen and a lot more studies need to be published as literature search shows very few published studies in this regard.

Andreo et al published a study titled: Elastic properties and scanning electron microscopic appearance of manual continuous curvilinear capsulorhexis and vitrectorhexis in an animal model of paediatric cataract. The authors concluded that manual CCC offered greater resistance to capsule tearing than the vitrectorhexis and also revealed a more smooth, regular edge. They therefore reiterated that manual rhesis remains the gold standard. The authors however stated that vitrectorhexis displayed more than adequate resistance to unwanted anterior capsule tears when used for IOL insertion through capsulotomy sizes currently used in clinical practice.

Trivedi et al published a similar study titled: Extensibility and scanning electron microscopy (SEM) evaluation of 5 paediatric anterior capsulotomy techniques in a porcine model. The authors concluded that the manual CCC technique produced the most extensible porcine capsulotomy, followed by the plasma blade, vitrectorhexis, can-opener, and radio-frequency techniques, in a porcine model. The manual CCC technique also produced the smoothest anterior capsulotomy edge according SEM evaluation.

In this video we clearly demonstrate the two techniques. In the manual technique a cystitome and forceps are used to make the rhexis and viscoelastic is injected through the opening to push the vitreous backward. This PCCC is safe because the smooth margin resists peripheral extension of tears. Vitrectorhexis is good alternative to manual CCC for young children when anterior vitrectomy is performed as part of primary management, especially in first 2 years of life when the capsule is very elastic and difficult to control. This relatively new technique has a much shorter learning curve and it reduces the surgical time to a great extent. The initial concerns regarding the safety of this technique can be laid to rest as this has emerged as a very safe technique and is predictable and reproducible.

References

Granuloma Mimicking Ocular Surface Squamous Neoplasia

Mona Bhargava, Aditi Ghosh Dastidar

Abstract: Purpose: To report a case of atypical conjunctival granuloma mimicking Ocular Surface Squamous Neoplasia (OSSN) at the recipient site of a conjunctival autograft. Methods: We report the clinical, surgical, post operative and histopathological findings of a granuloma mimicking OSSN lesion at the recipient site after an uneventful recurrent symblepharon release and excision with conjunctival autograft in a 18 year old male. Results: Histopathology of excised tissue showed a fibrovascular tissue in the dermis with overlying epithelial hyperplasia suggestive of granuloma. Conclusion: Conjunctival granuloma post surgery can be attributed due to fibrosis triggered by abnormal exposure of tenon’s capsule.

Introduction

 Conjunctival pyogenic granuloma is benign, fleshy, pedunculated, vascular mass presenting at the site of chronic infection or surface trauma. It is a misnomer as it is neither pyogenic nor granulomatous. Conjunctival granuloma has been reported as a complication status post pterygium, strabismus surgery and amniotic membrane transplant. We report a case of atypical conjunctival granuloma at the recipient site after conjunctival autograft in a case of symblepharon and pseudopterygium excision and conjunctival autograft.

Case Report

An eighteen year old male, who had undergone symblepharon release and pseudopterygium excision with conjunctival autograft in left eye at our institution two years back, presented with chief complaint of mass at recipient site since one month. Best corrected visual acuity in left eye was finger counting and 6/6 in right eye. On slit-lamp examination of the left eye, at the nasal side a mobile, velvety lesion with feeder vessels involving 7-10 o’clock hour position, 3.8 mm x 3 mm in size, was noted (Fig 1). There was no regional lymphadenopathy. Right eye anterior segment examination was unremarkable. Fundus examination in both eyes was normal. Ultrasound biomicroscopy showed conjunctival mass with no evidence of scleral involvement. Impression cytology suggested pleomorphic cells with no goblet cells and excision biopsy was suggested to confirm the diagnosis. Excision of the mass with cryotherapy with amniotic membrane transplant with fibrin glue was done, and specimen sent for histopathological examination. On hematoxylin and eosin stain epithelium with squamoid morphology, reduced goblet cells and dermis with fibrosed stroma, scattered vessels and focal collection of lymphocytic cells was noted (Fig 2). This was suggestive of conjunctival granuloma with no evidence of atypia and dyskeratosis seen in ocular surface squamous neoplasia. The patient had no evidence of recurrence till one month post-operative period (Fig 3) and and advised yearly follow up.

Discussion

Conjunctival granuloma has been reported as a complication post pterygium, strabismus surgery and amniotic membrane transplant. In this report the lesion had a velvety appearance with a feeder vessel thus clinically mimicking ocular surface squamous neoplasia. Excision and histopathological analysis is suggested in atypical cases to rule out ocular surface squamous neoplasia.

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References

Retinal Detachment in Retinitis Pigmentosa: Case Report with Review of Literature

Vaibhav Shrivastava

Abstract: We report the case of a 61 year old male with history of night blindness who presented with sudden painless loss of vision in his left eye since one day. On examination he had classical features of retinitis pigmentosa in both eyes with bullous inferior retinal detachment involving the macula with two adjacent horse-shoe tears at 2 o’clock in the left eye. Pars plana vitrectomy with silicone oil tamponade was done to reattach the retina followed by silicone oil removal 3 months later. A final visual acuity of 6/36 was obtained. We report this case because of the rarity of RD in patients with RP more so in an elderly patient and also because of the successful management of the case. There have been anecdotal reports of Retinal detachment (RD) in patients of Retinitis pigmentosa (RP) but the varied aetiologies and clinical features of such cases have not been comprehensively reviewed. We have compiled a review of literature discussing the varied presentations and aetiologies of RD in RP.

Key Words: Retinitis pigmentosa, Rhegmatogenous retinal detachment, Posterior vitreous detachment, Pars plana vitrectomy.

Introduction

RP is a disease involving the progressive degeneration of rod photoreceptors with characteristic fundus features of bone spicule pigmentation, disc pallor and arteriolar attenuation. Electoretinography (ERG) is the primary investigative modality, although most of the cases can be diagnosed clinically. Retinal detachment per se is extremely rare in RP and a few case reports have been published in literature. We report our case of rhegmatogenous retinal detachment (RRD) in a patient with RP. One of the key differences is that our patient was an elderly gentleman, unlike the younger patients who were reported earlier. The apparent hypothesis was that the retinopexy effect of the pigment spicules was not as well developed in the younger age group as in the elderly, allowing a posterior vitreous detachment to lead to a RRD. Rhegmatogenous,

Case Report

Figure 1: Montage Fundus photo at presentation- Subtotal RD with bony spicule pigmentation. Two horse-shoe tears adjacent to each other at 2 o’clock meridian.

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A 61 year old male came to us with sudden painless loss of inferior half of the visual field in the left eye since 1 day. He was previously diagnosed with RP and had a long standing history of night blindness. On examination, BCVA was RE-6/9 and LE-6/60. Anterior segment findings and intraocular pressures were within normal limits. On fundus examination he had bony spicule pigmentation, arteriolar attenuation and disc pallor in both the eyes suggestive of RP. Epiretinal membrane (ERM) on the macula was present in both eyes. In the left eye he had a bullous subtotal retinal detachment involving the macula with two horse-shoe tears adjacent to each other in superotemporal quadrant 2 o'clock at posterior pole and the equator. There were pigment cells in the vitreous. PVD was present in both the eyes. A Spectral domain OCT of left eye was done which showed massive subretinal fluid involving the macula along with an ERM over macula.

Keeping in view the significant disc pallor noted in the left eye, he was advised surgery under extremely guarded visual prognosis. The patient underwent a 360° encirclage (240 Band), pars plana vitrectomy, fluid air exchange, endolaser and silicon oil injection. Intraoperatively care was taken to keep the intensity of endoilluminator at a minimum to avoid any light induced macular toxicity. Intraocular pressure was maintained optimally throughout the surgery so as to avoid any insult to the already compromised optic disc.

Postoperative period was uneventful with an attached retina, thick gliotic scar at the site of posterior tear and an epiretinal membrane (ERM) at the macula. SD-OCT of the macula showed an attached retina with mild spongy macular oedema (CME). The silicon oil was removed 3 months post surgery along with internal limiting membrane and epiretinal membrane peeling. Postoperatively he had an attached retina. The patient was last examined 3 months after silicon oil removal and had an attached retina which was confirmed by OCT which also showed resolving macular oedema.
Giant retinal tears has also been reported by RY Kim and Johnston ME et al in RP patients. Interestingly, several case reports have shown that GRT is more common in RP patients with associated sensor neural hearing loss although a genetic correlation is yet to be established. Vitreous degenerative changes are also more common in RP. Posterior vitreous detachment (PVD) is seen at a younger age than general population. Early vitreous degenerative changes leading to premature separation of vitreous from retina also may be a possible protective factor. It is a known fact that RP is more common in myopes. Studies have shown that 75% of RP patients are myopes compared to 12% of normal population. Myopes have higher incidence of RRD because of greater prevalence of peripheral retinal degenerative changes. Hence it can be assumed that such degenerative changes may be more common in RP patients but because of the strong RPE-neurosensory retina adhesion in RP patients the RRD fails to get manifested in majority of cases. Pruett RC et al (1983) found neurosensory retinal breaks and/or rhegmatogenous detachment in only 7 (1.8%) of the 384 eyes.

**Discussion**

Literature review and our clinical experience support the fact that RD in RP can be of any aetiology—namely rhegmatogenous, tractional or exudative. Rarity of RD in RP can be because of the fact that bone spicule pigmentation seen beyond the arcades has a retinopexy like effect preventing the accumulation as well as progression of subretinal fluid. Since the adhesion between the retinal pigment epithelium (RPE) and neurosensory retina becomes stronger with age it has been argued that RD in RP is seen more in younger age group. Previous case reports of rhegmatogenous RD in RP had younger patients unlike our patient.

RRD is the most common presentation of RD among the reported cases. It has been hypothesised that pigment migration from RPE to neurosensory retina creates an adhesion like effect between the two layers thus preventing detachment. An unusual case was reported by Shoo yen Lee et al of a ring like RD peripheral to the macula probably due to limitation of progression of subretinal fluid by the strong adhesion between RPE and neurosensory retina also reaffirms this fact. RD due to giant retinal tears has also been reported by RY Kim and Johnston ME et al in RP patients. Interestingly, several case reports have shown that GRT is more common in RP patients with associated sensor neural hearing loss although a genetic correlation is yet to be established.

Vitreous degenerative changes are also more common in RP. Posterior vitreous detachment (PVD) is seen at a younger age than general population. Early vitreous degenerative changes leading to premature separation of vitreous from retina also may be a possible protective factor. It is a known fact that RP is more common in myopes. Studies have shown that 75% of RP patients are myopes compared to 12% of normal population. Myopes have higher incidence of RRD because of greater prevalence of peripheral retinal degenerative changes. Hence it can be assumed that such degenerative changes may be more common in RP patients but because of the strong RPE-neurosensory retina adhesion in RP patients the RRD fails to get manifested in majority of cases. Pruett RC et al (1983) found neurosensory retinal breaks and/or rhegmatogenous detachment in only 7 (1.8%) of the 384 eyes.

**Table 1: Summary of literature review of RD in retinitis pigmentosa patients.**

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Age/ Sex</th>
<th>Aetiology</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rhegmatogenous</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jin ZB et al (2008)</td>
<td>4 cases of FTMH one of which had an RD due to the same</td>
<td>FTMH</td>
<td>All cases treated with PPV in single surgery. Patient with RD did not have significant improvement.</td>
</tr>
<tr>
<td>Edward RS (1985)</td>
<td>Case series of 3 young males</td>
<td>Retinal breaks(HST/dialysis)</td>
<td></td>
</tr>
<tr>
<td>Demir MN et al (2007)</td>
<td>8/M</td>
<td>Retinal holes</td>
<td>Initially Scleral buckling done, failing which PPV done</td>
</tr>
<tr>
<td>Lee SY et al (2006)</td>
<td>47/M</td>
<td>HST at 12 o’clock</td>
<td>Macula on with surrounding ring of RD. Treated by PPV+Encirclage+C3F8</td>
</tr>
<tr>
<td>Hatta M et al (1999)</td>
<td>14/F</td>
<td>HST in superotemporal quadrant</td>
<td>Simultaneous retrobulbar ON. Treated by SB+Cryo+IVMP.</td>
</tr>
<tr>
<td>Kim RY et al (1996)</td>
<td>4 eyes of 3 patients</td>
<td>Giant retinal tears</td>
<td>Most of them had poor outcome. All cases associated with hearing loss.</td>
</tr>
<tr>
<td>Csaky K et al (1991)</td>
<td>Case report of 2 family members</td>
<td>Retinal hole in 35 yr. old male patient; RRD in a 65 year old female secondary to retinal holes</td>
<td>Both family members with retinitis pigmentosa sine pigmento</td>
</tr>
<tr>
<td><strong>Tractional</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shuichiro Hirahara et al (2010)</td>
<td>81/F</td>
<td>Transient TRD secondary to vitreoretinal traction</td>
<td>Resolved spontaneously after 8 months following PVD</td>
</tr>
<tr>
<td><strong>Exudative</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jemshed khan et al</td>
<td>Case series of 46 cases</td>
<td>Coats’ type exudative responsive leading to exudative RD</td>
<td>Most patients treated with photocoagulation and cryotherapy with varying success rates. Two patients treated with scleral buckling.</td>
</tr>
</tbody>
</table>
studied. Full thickness macular hole (FTMH) formation may also lead to Rhegmatogenous RD. The probable aetiologies for the formation of FTMH in RP can be long standing cystoid macular oedema (CME) or vitreomacular traction (VMT) both of which are frequent associations of RP. A case series of four RP patients with FTMH published by Jin Zi Bing et al found good results with Pars plana vitrectomy (PPV) in such cases although one of them had an extensive RD secondary to FTMH and did not have significant visual improvement after surgery.1

Both scleral buckling and PPV have been tried with varying success rate in patients with RD in RP. Most of the published case reports have performed PPV to treat RRD in RP. Young patients with uncomplicated RDs may be initially treated by scleral buckle failing which an internal approach may be tried. There have been no randomised studies comparing the two. In our case we had done a PPV combined with encircling buckle with silicon oil tamponade. A case of RRD in RP published by Demir MN et al was initially treated by scleral buckling failing which it was successfully treated by PPV.2 GRT in RP are generally associated with worse prognosis.3,7 A case series of 4 eyes of 3 such patients by RY Kim et al found high rates of recurrent detachments in patients with GRT in RP. Three of the 4 eyes went blind while the only eye having useful vision was, interestingly, the only eye treated by scleral buckling. Other patients were treated by encirclage with PPV with silicon oil tamponade.

Rarely, tractional RD may be associated with RP. A fibrotic reaction due to pigment migration may result in a tangential traction causing a tractional retinal detachment. RP is also associated with Cystoid macular oedema (CME) and such long standing CME may lead to formation of Epiretinal membrane and subsequent vitreomacular traction (VMT). Since vitreous degeneration is a common association, posterior hyaloid detaches earlier though it may remain attached to the macula leading to VMT. Long standing CME, ERM and VMT can lead to formation of macular hole and subsequent retinal detachment.8 Contraction of epiretinal and preretinal membranes also leads to tractional RD. Also incomplete PVD which is more common in RP may lead to vitreoretinal traction leading to an RD though it may not be labelled as a tractional RD in strict sense of terms as was reported by S Hirihara et al.11 Such detachments may resolve on its own once the whole posterior hyaloid gets separated.

An exudative type of serous retinal detachment may also be seen in Coats’ type of RP which is a rare entity, clinically distinct, from Coats disease. A case series analysis of 46 such cases by Jemshed Khan et al12 showed that it is not an association of Coats’ disease with RP but rather a Coats’ type of changes seen in patients with RP. Exudative RD seen in such cases are usually bilateral and generally involves the inferior quadrants unlike typical Coats disease which is unilateral and the exudative RD in such cases generally involves the superior quadrants. Vascular abnormalities overlying the area of detachment can be seen in such cases.13 Chronic RD complicated by ruberosis iridis and subretinal lipid deposition have also been seen in Coats’ type RP patients.14 The natural history of Coats’ type RP is quite variable and no single treatment modality appears to be effective. The exact aetipathogenesis of this clinical entity is obscure although most hypotheses stressed upon an incompetent blood brain barrier with subsequent leakage of serum constituents.15 Laser photocoagulation has been used to coagulate neovascular tufts and thus to obliterate the source of exudation. Cryotherapy has also been used to cause regression of neovascularisation and to treat areas of exudative detachment with some studies reporting better results than with laser photocoagulation.16 Barrage laser to area of detachment has also been done in case of macula-on detachments.17

Conclusion

To summarise, despite the numerous protective factors, retinitis pigmentosa may lead to retinal detachment. Our patient was a 61 year old unlike the younger patients reported in literature so far. Hence it can be presumed that old age is not an infallible protection against retinal detachment in such patients. All the three aetiological types of retinal detachment and sometimes combined mechanisms may be seen in RP. Due to an already compromised macula and optic disc surgical reattachment of retina in RP may not yield expected functional results. In our case report also the functional outcome did not correlate with the anatomical reattachment.

Methods of Literature Search

Articles in the English language were searched with the varying combinations of keywords such as Retinitis pigmentosa, Retinal detachment, Horse shoe tear, Coats type RP, Macular hole on PubMed. Individual case reports, case series of retinal detachment, giant retinal tears, retinal breaks, macular changes in RP and Coats type RP were also reviewed. Cross-references from these articles not highlighted in the PubMed search were also obtained and reviewed.

References


Albinotic Fundus

Autofluorescence in optic nerve head drusen

Basal cell carcinoma lower lid
Cicatrical ectropion in congenital ichthyosis

Lens coloboma

Morning glory disc


Abstract

Topic: To investigate the efficacy and safety of femtosecond laser-assisted cataract surgery (FLACS) relative to manual cataract surgery (MCS).

Clinical Relevance: It is unclear whether FLACS is more efficacious and safe relative to MCS.

Methods: A literature search of MEDLINE, EMBASE, and Scopus from 2007 to March 2016 was conducted. Studies containing both FLACS and MCS arms that reported on relevant efficacy and/or safety parameters were included. Weighted mean differences (WMDs) and risk ratios (RRs) with 95% confidence intervals (CIs) were calculated.

Results: From 2802 screened articles, 14,567 eyes from 15 randomized controlled trials and 22 observational cohort studies were included. For primary visual and refractive outcomes, no statistically significant difference was detected between FLACS and MCS in uncorrected distance visual acuity (WMD, -0.02; 95% CI, -0.04 to 0.01; P = 0.19), corrected distance visual acuity (WMD, -0.01; 95% CI, -0.02 to 0.01; P = 0.26), and mean absolute error (WMD, -0.02; 95% CI, -0.07 to 0.04; P = 0.57). In terms of secondary surgical end points, there was a statistically significant difference in favor of FLACS over MCS for effective phacoemulsification time (WMD, -3.03; 95% CI, -3.80 to -2.25; P < 0.001), capsulotomy circularity (WMD, 0.16; 95% CI, 0.11-0.21; P < 0.001), postoperative central corneal thickness (WMD, -6.37; 95% CI, -11.88 to -0.86; P = 0.02), and corneal endothelial cell reduction (WMD, -55.43; 95% CI, -95.18 to -15.69; P = 0.006). There was no statistically significant difference between FLACS and MCS for total surgery time (WMD, 1.25; 95% CI, -0.08 to 2.59; P = 0.07), capsulotomy circularity using a second formula (WMD, 0.05; 95% CI, -0.01 to 0.12; P = 0.10), and corneal endothelial cell count (WMD, 73.39; 95% CI, -6.28 to 153.07; P = 0.07). As well, there was a significantly higher concentration of prostaglandins after FLACS relative to MCS (WMD, 198.34; 95% CI, 129.99-266.69; P < 0.001). Analysis of safety parameters revealed that there were no statistically significant differences in the incidence of overall complications between FLACS and MCS (RR, 2.15; 95% CI, 0.74 to 6.23; P = 0.16); however, posterior capsular tears were significantly more common in FLACS versus MCS (RR, 3.73; 95% CI, 1.50-9.25; P = 0.005).

Conclusions: There were no statistically significant differences detected between FLACS and MCS in terms of patient-important visual and refractive outcomes and overall complications. Although FLACS did show a statistically significant difference for several secondary surgical outcomes, it was associated with higher prostaglandin concentrations and higher rates of posterior capsular tears.

Femtosecond Laser-assisted Cataract Surgery in Complex Cases.


Taravella MJ, Meghpara B, Frank G, Gensheimer W, Davidson R

Abstract

Purpose: To describe the use of the femtosecond laser in complex cataract cases.

Setting: Department of Ophthalmology, University of Colorado, Aurora, Colorado, USA.

Design: Retrospective case series.

Methods: This was a single-center retrospective review of consecutive complex cataract surgery cases in which the Lensx femtosecond laser was used between October 2012 and February 2015. Complex cases were defined as white cataracts, dense brownescent cataracts, or cataracts in which zonulopathy was identified preoperatively.

Results: Thirty-four eyes of 34 patients were included in this study; 27 had white cataract, 3 had dense brownescent cataract, and 6 had zonulopathy (2 of these also had white cataract). Three patients had an incomplete capsulotomy, and 3 had small radial tears in the anterior capsule. Four patients (11.7%) developed posterior capsule tears during phacoemulsification; 1 of these subsequently had pars plana vitrectomy for a retained lens fragment. Twenty-eight (97%) of 29 patients had a postoperative CDVA of 20/40 or better. Three patients were identified with comorbidities that limited postoperative CDVA. One patient developed postoperative cystoid macular edema.

Conclusion: The femtosecond laser was useful in the surgical approach to patients with complex cataracts, especially for the creation of the capsulotomy.
**Prostaglandin Eyedrops Are Associated With Decreased Thicknesses of Eyelid Dermis and Orbicularis Oculi Muscle: Ultrasonographic Findings**


Goh, Alice S.; Nassiri, Nariman; Kohn, Jocelyne C.; More

**Abstract:**

**Purpose:** To investigate the effect of prostaglandin analog eyedrops on the periorbital soft tissue using high-resolution ultrasonography.

**Methods:** In this cross-sectional study, the authors included patients with bilateral glaucoma on unilateral prostaglandin therapy for the past 12 or more contiguous months. High-resolution ultrasonography was performed bilaterally on the upper and lower eyelids of each subject to measure thicknesses of dermis, orbicularis oculi muscle, and skin to arcus marginalis distance. Comparisons were made between eyes on prostaglandin eyedrops versus those not on prostaglandin analogs.

**Results:** Twenty patients (16 females, 4 males) with a mean age of 67.2 ± 6.4 years were recruited. The mean duration of prostaglandin analog therapy was 5.4 ± 3.9 years. The authors found that eyes on prostaglandin analog therapy had statistically significantly reduced thicknesses of dermis, orbicularis oculi muscle, and skin to arcus marginalis distance in the upper and lower eyelids compared with the fellow eyes (p < 0.05 for all). In univariate regression analysis, the amount of changes in thicknesses of dermis, orbicularis oculi muscle, and skin to arcus marginalis distance among eyes on prostaglandin analog therapy and the fellow eyes was not statistically significantly associated with different variables including age, gender, years of being on prostaglandin analog therapy, type of prostaglandin analog, history of glaucoma and/or cataract surgeries, intraocular pressure, and number of glaucoma medications.

**Conclusions:** The findings indicate that eyes on prostaglandin analog therapy have reduced thicknesses of dermis, orbicularis oculi muscle, and skin to arcus marginalis distance compared with the fellow eyes.

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**Clinical and Microbiologic Features of Dacryocystitis-related Orbital Cellulitis.**


Wladis EJ, Shinder R, LeFebvre DR, Sokol JA, Boyce M.

**Abstract**

Dacryocystitis-related orbital cellulitis is a relatively rare condition, and large case series of this clinical entity have been reported. This study was undertaken to identify a larger cohort of patients with this ailment, with the intent of defining its clinical and microbiologic features. Case logs from four institutions were reviewed to identify patients that suffered from dacryocystitis-related orbital cellulitis. A retrospective chart review was then performed to identify clinical features, management strategies, microbiologic features, and outcomes. A dedicated statistical software package was utilized to identify correlations between these variables. 13 patients (7 females, 6 males; mean age = 57.2 years, range = 7-89 years) were identified. One patient carried a diagnosis of immunosuppressive disease. All patients underwent emergent surgical drainage and received intravenous antibiotics. Primary acquired nasolacrimal duct obstruction was found to be the underlying aetiology in nine cases (69.2%), whereas four patients suffered from specific causes of their obstructions. An average of 1.07 organisms/patient (standard deviation = 0.49 organisms/patient) were recovered from microbiologic cultures, and Gram-positive bacteria represented the majority of cultured organisms. All patients experienced either stable or improved vision upon discharge. The relationships between a specific aetiology and the possibility of vision loss or the number of organisms cultured, between the number of organisms cultured and vision loss, and immunosuppression and vision loss or the number of organisms cultured were all not statistically significant (p > 0.05). Dacryocystitis-related orbital cellulitis most commonly occurs in adult patients who do not carry immunosuppressive diagnoses and suffer from primary obstructions. Multiple microbiologic species may cause this problem, although Gram-positive organisms are most common. With appropriate management, stable or improved vision can be achieved.
Glaucoma : Dipanjan Pal

Inferior Macular Damage in Glaucoma: Its Relationship to Retinal Nerve Fiber Layer Defect in Macular Vulnerability Zone

February 2017 - Volume 26 - Issue 2 - p 126–132
doi: 10.1097/IJG.0000000000000576

Kim, Young Kook; Jeoung, Jin Wook; Park, Ki Ho

Abstract

Purpose of the Study: The purpose of the study was to investigate the prevalence of abnormal thinning of the inferior macular ganglion cell-inner plexiform layer (mGCIPL) in glaucoma and to understand its relationship to abnormal regions of the peripapillary retinal nerve fiber layer (pRNFL), including the macular vulnerability zone (MVZ).

Patients and Methods: We evaluated 186 eyes (186 patients) with glaucoma. An integrated deviation map was merged by superimposition of mGCIPL and pRNFL deviation maps (from a spectral-domain optical coherence tomography) onto RNFL photography as aligned by Photoshop software based on vascular landmarks. The peripapillary area was divided into 2 locations according to a previously suggested schematic model: (1) the MVZ; and (2) the infero-inferior portion.

Results: The key findings of the topographic analysis of mGCIPL and pRNFL deviation maps were as follows: (1) 145 of 186 eyes showed inferior mGCIPL loss; (2) if a defect existed in the MVZ of the pRNFL (63 eyes), there was also an inferior mGCIPL defect; (3) however, the other 82 eyes with inferior mGCIPL abnormalities showed an abnormal mGCIPL without a corresponding pRNFL defect in the MVZ.

Conclusions: There was no single case of pRNFL defect in the MVZ without inferior mGCIPL loss. However, there were a few cases of inferior mGCIPL loss without pRNFL defect in the MVZ. These findings signify that detection of inferior mGCIPL loss might be earlier than that of pRNFL defect in the MVZ. Therefore, pRNFL analysis of the optical coherence tomography disc cube scan alone is insufficient for detection of early-stage glaucomatous damage.

Effectiveness of early lens extraction for the treatment of primary angle-closure glaucoma (EAGLE): a randomised controlled trial

Augusto Azuara-Blanco, Jennifer Burr, Craig Ramsay, David Cooper, Paul J Foster, David S Friedman, Graham Scotland, Mehdi Javanbakht, Claire Cochrane, John Norrie, for the EAGLE study group

Summary

Background Primary angle-closure glaucoma is a leading cause of irreversible blindness worldwide. In early-stage disease, intraocular pressure is raised without visual loss. Because the crystalline lens has a major mechanistic role, lens extraction might be a useful initial treatment.

Methods From Jan 8, 2009, to Dec 28, 2011, we enrolled patients from 30 hospital eye services in five countries. Randomisation was done by a web-based application. Patients were assigned to undergo clear-lens extraction or receive standard care with laser peripheral iridotomy and topical medical treatment. Eligible patients were aged 50 years or older, did not have cataracts, and had newly diagnosed primary angle closure with intraocular pressure 30 mm Hg or greater or primary angle-closure glaucoma. The co-primary endpoints were patient-reported health status, intraocular pressure, and incremental cost-effectiveness ratio per quality-adjusted life-year gained 36 months after treatment. Analysis was by intention to treat. This study is registered, number ISRCTN44464607.

Findings of 419 participants enrolled, 155 had primary angle closure and 263 primary angle-closure glaucoma. 208 were assigned to clear-lens extraction and 211 to standard care, of whom 351 (84%) had complete data on health status and 366 (87%) on intraocular pressure. The mean health status score (0.87 [SD 0.12]), assessed with the European Quality of Life-5 Dimensions questionnaire, was 0.052 higher (95% CI 0.015–0.088, p=0.005) and mean intraocular pressure (16.6 [SD 3.5] mm Hg) 1.18 mm Hg lower (95% CI –1.99 to –0.38, p=0.004) after clear-lens extraction than after standard care. The incremental cost-effectiveness ratio was £14 284 for initial lens extraction versus standard care. Irreversible loss of vision occurred in one participant who underwent clear-lens extraction and three who received standard care. No patients had serious adverse events.

Interpretation Clear-lens extraction showed greater efficacy and was more cost-effective than laser peripheral iridotomy, and should be considered as an option for first-line treatment.
Polypoidal Choroidal Vasculopathy Upon Optical Coherence Tomographic Angiography.

Chan SY, Wang Q, Wang YX, Shi XH, Jonas JB, Wei WB.

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Beijing Tongren Eye Center, Beijing Tongren Hospital, Beijing Ophthalmology and Visual Science Key Lab, Capital Medical University, Beijing, China; Beijing Institute of Ophthalmology, Beijing Tongren Eye Center, Beijing Tongren Hospital, Capital Medical University, Beijing Ophthalmology and Visual Science Key Lab, Beijing, China; and Department of Ophthalmology, Medical Faculty Mannheim of the Ruprecht-Karls-University Heidelberg, Mannheim, Germany.

Purpose: To study polypoidal lesions and branching choroidal vascular networks in eyes with polypoidal choroidal vasculopathy by optical coherence tomography (OCT)-based angiography (OCTA).

Methods: In the observational cross-sectional study, patients with polypoidal choroidal vasculopathy, as diagnosed by indocyanine green angiography, underwent OCTA.

Results: Thirty-two eyes of 31 patients with an age of 61.1 ± 7.6 years were included. Branching choroidal vascular networks were detected by indocyanine green angiography and OCTA in 25 of 32 (78 ± 73%) and in 30 of 32 (94 ± 4%) eyes, respectively, with a marginally significant difference (P = 0.06) in the detection rate between both techniques. A total of 72 polyps (area, 0.06 ± 0.06 mm; range, 0.01-0.27 mm) were detected by indocyanine green angiography, and they were consistently present on the OCTA images. By moving the reference level in the OCT angiograms to the corresponding layer, the polypoidal lesions showed cluster-like structures in 53 of 72 polypoidal lesions (74%). In 60 of the 72 polypoidal lesions (83%), cluster-like structures were detected in the en face structural OCT images at the reference plane of the OCTA images. On the cross-sectional OCT images, some internal channels of flow were seen in 50 of the 72 polypoidal lesions (69%). Larger size of the polypoidal lesions was associated with a higher prevalence of cluster-like structures on the OCTA images, some internal channels of flow on the en face structural images, and clustered vascular structures on the cross-sectional OCT images.

Conclusion: In conclusion, OCTA is a useful technique for the noninvasive detection of branching choroidal vascular networks including visualization of details such as cluster-like structures and flow. In some eyes, OCTA was superior to indocyanine green angiography to detect polypoidal choroidal vasculopathy and to show branching choroidal vascular networks.

Suprachoroidal Buckling for the Management of Rhegmatogenous Retinal Detachments Secondary to Peripheral Retinal Breaks.

El Rayes EN, Mikhail M, El Cheweiky H, Elsawah K, Maia A.

Author information:
Retina Department, Institute of Ophthalmology, Cairo, Egypt; Department of Ophthalmology, McGill University, Montreal, Quebec, Canada; Department of Ophthalmology, Cairo University, Cairo, Egypt; and Department of Ophthalmology, Federal University of Sao Paulo, Sao Paulo, Brazil.

Purpose: To evaluate functional and anatomical outcomes of eyes undergoing suprachoroidal buckling for the management of peripheral retinal breaks in rhegmatogenous retinal detachment.

Methods: Retrospective cohort study of 41 eyes of 41 patients undergoing suprachoroidal buckling for the management of rhegmatogenous retinal detachment secondary to single or multiple retinal breaks. Suprachoroidal indentation was achieved through the introduction of filler material using a 23-gauge (23-G) olive-tipped, suprachoroidal cannula. This allowed for the creation of a suprachoroidal dome and chorio-retinal apposition. Healon5 (Abbott Medical Optics) was used as filler material in all eyes. Combined 25-G vitrectomy was performed in 5 eyes. Cryopexy and laserpexy were used in 37 and 4 eyes, respectively.

Results: Mean visual acuity gain was the primary outcome measure. Final retinal reattachment rate, single-surgery reattachment rate, and complications were secondary outcome measures. Mean best-corrected distance visual acuity improved from 20/1,100 to 20/42. Single surgery reattachment rate was 92.7% (38/41 eyes). Final retinal reattachment was achieved in all 41 eyes (100%). There was no statistically significant difference in visual acuity gain or anatomical reattachment in terms of retinal break quadrant or extent. No major complications were observed. Two localized suprachoroidal hemorrhages occurred at the entry site for the cannula. These resolved without further intervention.

Conclusion: Suprachoroidal buckling using a specially designed cannula is a safe and effective procedure for the management of rhegmatogenous retinal detachment secondary to peripheral retinal breaks.
A multicenter, open-label, 52-week study of 2% rebamipide (OPC-12759) ophthalmic suspension in patients with dry eye.


Purpose: To investigate the efficacy and safety of 2% rebamipide ophthalmic suspension administered 4 times daily for 52 weeks in patients with dry eye.

Design: Multicenter (17 sites), open-label, single-arm study.

Methods: A total of 154 patients with dry eye were enrolled in this study. After a 2-week screening period, patients received 2% rebamipide, instilled as 1 drop in each eye, 4 times daily for 52 weeks. The signs and symptoms measures were assessed at baseline, at weeks 2 and 4, and at every 4 weeks thereafter. The objective signs were fluorescein corneal staining score, lissamine green conjunctival staining score, and tear film break-up time, while subjective symptoms were dry eye-related ocular symptoms (foreign body sensation, dryness, photophobia, eye pain, and blurred vision). The safety variable was the occurrence of adverse events.

Results: For all objective signs and subjective symptoms, the scores significantly improved at week 2 compared with baseline (P < .001, paired t test). Interestingly, further improvements of those scores were observed at every visit up to week 52. No deaths were reported, yet serious adverse events that were not thought to be drug related were observed in 6 patients. The incidence of any of the adverse events did not markedly increase throughout the 52-week treatment period.

Conclusion: The results of this study show that 2% rebamipide is effective in improving both the objective signs and subjective symptoms of dry eye patients for at least 52 weeks. In addition, 2% rebamipide treatment was generally well tolerated.

The Role of Rho Kinase Inhibitors in Corneal Endothelial Dysfunction.


Okumura N, Kinoshita S, Koizumi N.

Background: The cornea is transparent tissue that serves as the window of the eye, allowing light to enter from the outer environment. The corneal endothelium maintains corneal transparency; thus, its dysfunction results in corneal haziness and causes severe vision loss. The only available therapeutic choice for treating corneal endothelial dysfunction has been transplantation using donor corneas; consequently, researchers have been pressed to develop new therapeutic options.

Methods: The goal of the review is to provide an overview of the research into Rho kinase (ROCK) inhibitors in the field of corneal endothelium therapy and the potential for clinical use of ROCK inhibitors.

Results: We reported that ROCK inhibitor enhances wound healing in the corneal endothelium. We further proposed the development of ROCK inhibitors as drugs that suppress the incidence of bullous keratopathy following severe corneal endothelial damage, especially that occurring during cataract surgery, one of the leading causes of corneal transplantation. We also proposed the use of ROCK inhibitors as adjunct drugs for cell-based therapeutic treatment of corneal endothelial dysfunction. ROCK inhibitors promote the engraftment of injected cultured corneal endothelial cells to the recipient cornea, thereby enabling the regeneration of corneal endothelium. Of note, we have initiated clinical research into cell injection therapy using a ROCK inhibitor as an adjunct drug.

Conclusion: This review documents the potency of ROCK inhibitors in clinical use, both as eye drops and as adjunct drugs for cell-based therapy for the treatment of corneal endothelial dysfunction.

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Neuro-ophthalmic Emergencies

doi: 10.1016/j.jfo.2016.05.003. Epub 2016 Sep 14
Caignard A, Leruez S, Milea D.

Abstract

Neuro-ophthalmic emergencies can cause life-threatening or sight-threatening complications. Various conditions may have acute neuro-ophthalmic manifestations, including inflammatory or ischemic processes, as well as tumoral, aneurysmal compression or metabolic and systemic diseases. Diplopia related to a partial third nerve palsy with pupillary involvement may reveal an intracranial aneurysm. Abnormalities of conjugate gaze may reveal an inflammatory or ischemic lesion, most often of the brainstem. An intracranial tumor may also manifest itself as a single or multiple oculomotor palsy, or causing various visual field defects, due to optic nerve, chiasm or retrochiasmal involvement. Arteritic anterior ischemic optic neuropathy may be the first manifestation of giant cell arteritis, prompting rapid treatment with steroids to prevent contralateral involvement. A (painful) Horner syndrome may be the presenting sign of carotid dissection, or it may be a sign of a central or thoracic sympathetic lesion. Beyond these classical emergencies, this non-exhaustive review will also present more rare clinical situations, describing novel algorithms for quick recognition and prompt intervention in acute neuro-ophthalmology.

Clinical Profile and Neuroimaging in Paediatric Optic Neuritis in Indian Population: A Case Series.

Khadse R, Ravindran M, Pawar N, Maharajan P, Rengappa R.

Abstract

Purpose of the study: The purpose of this study was to report clinical features, neuroimaging, and visual outcome in pediatric optic neuritis (ON) in Indian population.

Materials and methods: This is a retrospective study of children up to the age of 16 years, diagnosed with ON, that presented at pediatric and neuroophthalmology clinic of a tertiary eye care center, in South India, within the period of 2010-2015.

Results: We identified 62 eyes of 40 children diagnosed as ON within the study period. The mean age was 11.15 ± 3.24 years (1-15 years) with mean follow-up of 13 months. In this series, there was female preponderance (67%). Mean logarithm of the minimum angle of resolution visual acuity at presentation was 1.14 ± 0.93, which after treatment recovered to 0.10 ± 0.26 at final visit (P < 0.001). Involvement was bilateral in 22 children (55%) and recurrent in 3 eyes of 3 children. Preceding febrile illness was reported in seven cases (18%). Four (10%) cases were diagnosed as multiple sclerosis (MS), one with neuromyelitis optica, and one with acute disseminated encephalomyelitis. One case was associated with tuberculous meningitis, 1 with septicemia, and 1 with bilateral maxillary sinusitis. Neuroimaging studies of optic nerve in 14 children demonstrated isolated optic nerve enhancement. Magnetic resonance imaging brain revealed white matter T2 hyperintense lesions separate from optic nerve in ten cases, of which four cases were diagnosed as MS.

Conclusions: Bilateral presentation was common, association with MS was low. Papillitis was more frequent than retrobulbar neuritis and prognosis was good in paediatric ON in Indian population.
Development of Monofixation Syndrome After Extraction of Dense Cataracts.


Eustis HS, Janot A, Jhaveri C.

Abstract

Purpose: If the interruption of macular fusion for an extended period of time is the key event that results in the development of monofixation syndrome, then the decreased macular input caused by dense cataracts may cause monofixation syndrome in adults. This study was designed to test this hypothesis.

Methods: The study design was a retrospective chart review that identified patients with unilateral cataracts at two southern Louisiana medical centers. Patients were assigned to the dense cataract group if a unilateral cataract had been present for at least 3 months and led to a visual acuity of worse than 20/200. Patients in the control group had a unilateral cataract for more than 3 months and visual acuity better than 20/200 in the affected eye. Stereoaucity was assessed using the Titmus or Randot stereo test. A Worth 4-dot test viewed at a distance of 20 feet was used to assess the presence of a macular scotoma. The criteria for monofixation syndrome were met if stereoaucity was less than 60 seconds and the Worth 4-dot test demonstrated central macular scotoma at 20 feet.

Results: The dense cataract group's association with monofixation syndrome was statistically significant when compared to the control group (P < .0001).

Conclusions: This study adds dense adult-onset cataracts to the list of causes of monofixation syndrome and reduced stereoaucity. A delay in treating dense lens opacities can result in good visual outcome but an inferior binocular visual outcome (poor stereoaucity).

Comparison of Botulinum Toxin With Surgery for the Treatment of Acute-Onset Comitant Esotropia in Children

Michael J. Wan, Iason S. Mantagos, Ankoor S. Shah, Melanie Kazlas, David G. Hunter

Abstract

Purpose: To determine whether botulinum toxin is as effective as strabismus surgery in the treatment of acute-onset comitant esotropia in children.

Design: Retrospective, nonrandomized, comparative clinical study.

Methods: Setting: Tertiary care pediatric hospital. Study Population: Forty-nine children with acute-onset comitant esotropia. Intervention: Treatment with either botulinum toxin ("chemodenervation group") or standard incisional strabismus surgery ("surgery group"). Main Outcome Measure: Success rate at 6 months (total horizontal deviation of 10 prism diopters or less and evidence of binocular single vision).

Results: There were 16 patients in the chemodenervation group and 33 patients in the surgery group. The success rate was not significantly different at 6 months (81% vs 61%, P = .20) or at 18 months (67% vs 58%, P = .74). The median angle of deviation and median stereoaucity were not significantly different at 6 or 18 months. The chemodenervation procedure was not inferior to incisional strabismus surgery at 6 months. The duration of general anesthesia (5 vs 71 min, P < .001) and time in the post–anesthesia care unit (37 vs 93 min, P < .001) were significantly shorter in the chemodenervation group. Botulinum toxin injection payment averaged $ 874 per procedure compared with $ 2783 for strabismus surgery.

Conclusions
Botulinum toxin is at least as effective as surgery in the treatment of acute-onset comitant esotropia at 6 months while reducing the duration of general anaesthesia and healthcare costs.
Uveitis : Santanu Mandal

Predictors of Long-Term Visual Outcome in Intermediate Uveitis

Rachael L. Niederer, Lazha Sharief, Asaf Bar, Sue L. Lightman, Oren Tomkins-Netzer

Abstract

Purpose: To describe factors that predict visual loss and complications in intermediate uveitis.

Design: Cross-sectional study.

Participants: Subjects with intermediate uveitis were identified from a database of 1254 uveitis patients seen in the clinic of a single consultant (S.L.L.) between 2011 and 2013.

Methods: Information was gathered from the clinical notes of all subjects examined in clinic.

Main Outcome Measures: Best-corrected visual acuity (BCVA), moderate visual loss (MVL;≤20/50), severe visual loss (SVL; ≤20/200).

Results: Three hundred and five subjects (550 eyes) were included in the study, comprising 24.3% of subjects seen in clinic. Mean (± standard deviation) age at diagnosis was 40.9±16.9 years, and 64.6% of subjects were female. Median follow-up was 8.2 years (mean, 9.7 years, 5452 eye-years). Systemic diagnosis was made in 36.1% of patients, with sarcoidosis (22.6%) and multiple sclerosis (4.6%) the most frequent systemic associations. Median BCVA was 20/30 (mean logarithm of the minimum angle of resolution [logMAR] 0.26±0.38, n = 550 eyes) at presentation, 20/30 (mean logMAR 0.22±0.42, n ≈ 430) at 5 years, and 20/30 (mean logMAR 0.23±0.46, n = 260) at 10 years. Macular edema was observed in 224 eyes (40.7%) and was associated with idiopathic disease (P = 0.001) and diabetes (P = 0.001). Topical therapy was used in 82.7%, and 34.2% received local injections of corticosteroids. A total of 50.5% required oral steroids and 13.8% required second-line immunosuppression. Subjects with a diagnosis of sarcoidosis were less likely to require a second-line agent (4.3% vs. 16.2%, P = 0.011). On multivariate analysis, visual acuity at referral, retinal pigment epithelial atrophy, and macular scarring were associated with increased risk of MVL; and visual acuity at referral, local therapy, macular scarring, retinal detachment, and hypotony and phthisis were associated with increased risk of SVL.


Cataract Surgery Outcomes in Uveitis

H. Nida Sen, Francis M. Abreu, Thomas A. Louis, Elizabeth A. Sugar, Michael M. Altwawel, Susan G. Elner, Janet T. Holbrook, Douglas A. Jabs, Rosa Y. Kim, John H. Kempen, for the Multicenter Uveitis Steroid Treatment (MUST) Trial and Follow-up Study Research Group*

Abstract

Purpose: To assess the visual outcomes of cataract surgery in eyes that received fluocinolone acetonide implant or systemic therapy with oral corticosteroids and immunosuppression during the Multicenter Uveitis Steroid Treatment (MUST) Trial.

Design: Nested prospective cohort study of patients enrolled in a randomized clinical trial.

Participants: Patients that underwent cataract surgery during the first 2 years of follow-up in the MUST Trial.

Methods: Visual outcomes of cataract surgery were evaluated 3, 6, and 9 months after surgery using logarithmic visual acuity charts. Change in visual acuity over time was assessed using a mixed-effects model. Main Outcome Measures: Best-corrected visual acuity.

Results: After excluding eyes that underwent cataract surgery simultaneously with implant surgery, among the 479 eyes in the MUST Trial, 117 eyes (28 eyes in the systemic, 89 in the implant group) in 82 patients underwent cataract surgery during the first 2 years of follow-up. Overall, visual acuity increased by 23 letters from the preoperative visit to the 3-month visit (95% confidence interval [CI], 17±29 letters; P < 0.001) and was stable through 9 months of follow-up. Eyes presumed to have a more severe cataract, as measured by inability to grade vitreous haze, gained an additional 42 letters (95% CI, 34e56 letters; P = 0.001) beyond the 13-letter gain in eyes that had gradable vitreous haze before surgery (95% CI, 9e18 letters; P < 0.001) 3 months after surgery, making up for an initial difference of 45 letters at the preoperative visit (95% CI, 56 to 34 letters; P < 0.001). Black race, longer time from uveitis onset, and hypotony were associated with worse preoperative visual acuity (P < 0.05), but did not affect postsurgical recovery (P > 0.05, test of interaction). After adjusting for other risk factors, there was no significant difference in the improvement in visual acuity between the 2 treatment groups (implant vs. systemic therapy, 2 letters; 95% CI, 10 to 15 letters; P = 0.70).

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