

List of publications of LJEI Consultants:

1. **Singh S**, Ali MJ. OCT of Proximal Lacrimal System. In: *Principles of Lacrimal Surgeries, 2nd Ed.* Ed.: Ali MJ. Springer. New Delhi. In Press.
2. Nair AG, **Singh S**. Botulinum Toxin and Dermal Fillers in Ophthalmology. In: *Dutta's Modern Ophthalmology*. Ed: Mukherjee B. Jaypee Brothers Medical Publishers, New Delhi. In Press
3. **Singh S**, Ghosh A, Rath S. Imaging of Proximal Lacrimal System with Time Domain Anterior Segment Optical Coherence Tomography in Normal Asian Indian Population. Orbit 2017 Epub.

This article reports proximal lacrimal system parameters using Anterior Segment Optical Coherence Tomography (ASOCT-Visante) in an apparently normal Asian Indian population with assessment of any correlation between tear meniscus height and punctal diameter. This was a prospectively designed observational study that included healthy adults, who volunteered for optical coherence tomography imaging (OCT) of their proximal lacrimal system. Time domain ASOCT (Visante) images of the punctum and proximal canaliculus were captured using the high resolution corneal scan protocol. External lacrimal punctal diameter (ELP), internal lacrimal punctal diameter (ILP), vertical canalicular length (VCL) and tear meniscus height (TMH) were calculated. Statistical analysis was performed using Pearson's correlation test. Our study had 100 normal subjects with mean age 24.14 years, range 15–38 years. ASOCT (Visante) with advantage of deeper penetration was able to image canaliculus in all cases. The mean TMH, ELP, ILP and VCL was $252.7 \pm 67.98 \mu\text{m}$, $382.2 \pm 103.14\mu\text{m}$, $140.7 \pm 67.29 \mu\text{m}$ and $811.8 \pm 253.7 \mu\text{m}$, respectively, in 100 normal subjects. No correlation was found between ELP, ILP and TMH (Pearson's Correlation; $r = -0.355$, $p > 0.05$ for all). ASOCT (VisanteTM) is a non-invasive and easy to use objective tool for imaging proximal lacrimal system. Further studies are required to validate normative data and correlate with microscopic findings of lacrimal system.
4. **Singh S**, Kaliki S. White reflex in a 4-year child. Oman J Ophthal.

An otherwise healthy 4-year-old boy presented with white reflex in the left eye (OS) of 6 weeks duration. Visual acuity in right eye was 20/20 and light perception in OS. Fundus examination OS revealed total exudative retinal detachment with retinal vessel telangiectasia and subretinal yellowish deposits. A diagnosis of Coats disease was thus established. Coats disease is the most common (40%) lesion simulating retinoblastoma.¹ Detailed observation of color of white reflex (more yellowish as compared to more white of retinoblastoma) and clear vitreous in Coats disease (in contrast to vitreous seeds in retinoblastoma) are other clinical signs which aid in differentiating among them.

5. **Singh S, Mittal V, Narang P.** Getting hooked: Eyelash in Lacrimal Punctum. Saudi J Ophthalmol. 2017

Eyelash arrest in lacrimal punctum is a very rarely seen phenomenon. Unrecognised retained intraocular foreign bodies in young children can present as unilateral conjunctivitis/keratoconjunctivitis. Eyelash impaction in lacrimal punctum has been reported only once in literature where conjunctival granuloma was excised along with lash removal. In our case, eyelash removal alone resolved the symptoms promptly. Careful ocular evaluation with everted eyelid inspection should be performed to rule out hidden foreign bodies.

6. **Singh S, Mittal R, Rath S.** Multifocal Ocular Surface Squamous Neoplasia. Ophthalmol Plast Reconstr Surg 2017 (Epub).

A 64-year-old healthy female presented with a papillomatous limbal lesion involving 6 clock hours of superior limbus and diffuse involvement of upper tarsal conjunctiva of left eye of 6 months duration. Excision of superior limbal lesion on histopathology showed carcinoma in situ with focal breach in basement membrane and moderate degree of differentiation. The surgical base and margins were uninvolved. The tarsal lesion was initially treated with subconjunctival interferon alpha 2b (IFN alpha 2b) (3 cycles of IFN alpha 2b) with poor response. Subsequently treatment with topical mitomycin C 0.04% showed a dramatic response in the upper eyelid tarsal lesion. A small residual lesion needed excision. One year after treatment, she was completely tumor-free. In multifocal ocular surface squamous neoplasia, multimodal treatment with excision and topical mitomycin C may be effective in cases refractory to immunotherapy.

7. Kaliki S, **Singh S**, Naik MN. Long term follow up of OSSN in papillon Lefevre syndrome. *Cornea* 2017;36:743–746

Purpose: To discuss the association between ocular surface squamous neoplasia (OSSN) and Papillon–Lefèvre syndrome (PLS) and present the long-term outcome in a patient with these diseases. Methods: Case report. Results: A 14-year-old boy presented with a raised pigmented mass lesion at the limbus in the right eye, which was clinically suggestive of OSSN. He also had palmoplantar hyperkeratosis and periodontitis suggestive of PLS. Excision biopsy of the lesion confirmed the diagnosis of OSSN. He was free of tumor recurrence for 2 years and was lost to follow-up thereafter. Seven years later, the patient presented with diffuse tumor recurrence with orbital extension in the right eye, regional lymph node metastasis, and ipsilateral parotid gland infiltration. The patient underwent exenteration of the right orbital contents, right parotidectomy, and radical neck dissection followed by concomitant external beam radiotherapy and systemic chemotherapy. Eleven years from initial presentation, the patient was detected to have OSSN in the contralateral eye and was managed by wide excision biopsy and adjuvant cryotherapy. One year after detection of OSSN in the left eye, the patient was found to have systemic metastases to the lungs and brain. The patient died of the disease within 3 months of detection of systemic metastasis. Conclusions: OSSN in PLS is associated with poor prognosis.

8. Ali MJ, **Singh S**, Ganguly A, Naik MN. Dacryoendoscopy-guided transcanalicular intralesional interferon alpha 2b for canalicular squamous papillomas. *Int Ophthalmol* 2017.

Canalicular papillomatosis is a rare disorder characterized by a mass lesion arising from the epithelium as a stalk from one of the canalicular walls. Traditionally, they have been treated with an open canaliculotomy and excision biopsy with or without additional cryotherapy. A patient with upper canalicular squamous papillomas treated with dacryoendoscopy-guided transcanalicular intralesional and topical interferon alpha 2b is presented, and the ineffectiveness of interferons in this case is discussed.

9. **Singh S**, Alam S, Ali MJ, Naik MN. Endoscopic intranasal findings in unilateral primary acquired nasolacrimal duct obstruction. *Saudi J Ophthalmol.* 2017

Purpose: To evaluate intranasal endoscopic findings in patients with unilateral primary acquired nasolacrimal duct obstruction and compare them with the normal cohort. Methods: A prospective case-control study with 50 unilateral primary acquired nasolacrimal duct obstruction (PANDO) and 50 healthy controls. All patients were evaluated by endoscopic nasal examination for the presence of deviated nasal septum(DNS), type of deviation (bony or cartilaginous), side of deviation, septal spurs, caudal dislocation, any turbinate hypertrophy and endoscopic features suggestive of sinusitis. Results: A significant increase in the incidence of nasal septal deviation was found in PANDO cases (60%, 30/50) compared to controls (36%; 18/50; P = 0.03). The laterality of septal deviation corresponded to the side of NLD obstruction in 90% (27/30) cases. Higher location of DNS (73% vs 22%; P = 0.0009) and bony deviation (77% vs 44%; P = 0.02) were observed among study group as compared to controls. The odds of having NLD obstruction are 2.7 times more among individuals having septal deviation versus no deviation (95% CI, 1.19–5.99). Conclusion: Unilateral PANDO has a higher incidence of ipsilaterally deviated nasal septum. This association is significant. Routine nasal endoscopic examination should be performed in cases undergoing dacryocystorhinostomy to better plan a concomitant septoplasty if needed.

10. Ali MJ, **Singh S**, Naik MN. Endoscopic features of a lacrimal sac in a case of punctal and canalicular agenesis. *Ophthal Plast Reconstr Surg* 2017;33:153-154.

The aim of this study was to illustrate the surgical techniques and utility of stereotactic or image-guided navigation in the management of lacrimal drainage obstruction in congenital arhinia-microphthalmia syndrome and review the relevant literature. Image-guided combined external and endoscopic dacryocystorhinostomy was performed in a female, aged 16 years with congenital partial arhinia and ipsilateral microphthalmus. The lacrimal sac was bypassed to the contra lateral nasal cavity through a septal window. The surgical procedure was performed using the intra-operative optical image-guided Nav 1 Pico™ ENT navigation system with real-time intra-operative instrument geometry. Different phases of the surgical technique, adjunctive endoscopic procedures, intra-operative anatomical guidance, and utility at crucial phases of surgery were noted. A review of the literature was performed

pertinent to arhinia and navigation guided lacrimal surgeries. Lacrimal bypass into the contra lateral nasal cavity even through a malformed septum is possible in partial arhinia syndromes. Detailed preoperative evaluation including 3D imaging studies, navigation guided planning of risk structures with intra-operative distance control and construction of meticulous surgical roadmaps were found to be essential factors in successful outcomes. At six months follow up after surgery, there was a complete and contiguous healed mucosal anastomosis with lacrimal system patent on irrigation and resolution of epiphora. Combined external and endoscopic approach is useful in partial arhinia syndromes. Image guidance is a very useful adjunctive tool that facilitates safe and precise surgery in the management of such complex lacrimal surgeries.

11. Ali MJ, **Singh S**, Naik MN. High-definition dacryoendoscopic features of a canalicular squamous papilloma. *Int Ophthalmol* 2016 (Epub).

Canalicular papillomatosis is a rare but important differential diagnosis of a mass lesion in the proximal lacrimal drainage system. The usual modalities of treatment have been canaliculotomy, excision biopsy and cryotherapy, but in spite of these, multiple recurrences are known. HD-DEN is a useful modality for diagnosis and follow-up after treatment to ascertain the cure or recurrences.

12. **Singh S**, Ali MJ, Peguda HK, Naik MN. Imaging the canaliculops with Ultrasonic biomicroscopy and anterior segment optical coherence tomography. *Ophthal Plast Reconstr Surg* 2017 (Epub).

Canaliculops is a noninflammatory and noninfectious ectasia of the canaliculus with serous fluid accumulation. Currently, the etiology is uncertain. To the best of the authors' knowledge only 6 confirmed cases have been published earlier; however, the imaging features were not described. The authors report the ultrasound biomicroscopic and ocular coherence tomography features of a histopathologically proven canaliculops.

13. **Singh S**, Rath S. Canalicular lacerations: Factors predicting outcome at a tertiary eye care. *Orbit* 2017;36:13-18.

To determine the factors predictive of outcome in canalicular laceration repair at a tertiary eye care centre. A retrospective review of the medical records of all primary

canalicular laceration repairs managed at a tertiary eye care centre between the years 2006 and 2014 was done. Thirty nine patients were included and majority were male (79.5%) with a mean age of 30.05 ± 16.2 years (range 2–65). Most (n = 34) had monocanalicular laceration and 5 had bicanalicular laceration. All surgeries were done in the operating room setting. Overall patency by irrigation was seen in 74.4% at a median follow-up of 19.89 weeks (range 21–910). Anatomical outcome was different among the stents and best after Mini-Monoka monocanalicular stent (17/19; 89.5%) followed by bicanalicular annular stents (n = 6; 60%) and 20G Silicone rod (8/14, 57%). The factors predictive of poor outcome were related to the mode of injury [road traffic accidents; Hazard ratio (HR)19.57; p = 0.048] and the type of stent [20G silicone rod (HR 35.7; C.I 3.04 - 419.14; p = 0.004)] by multivariate analysis. Skill of the surgeon was critical as the outcome for fellows-in-training showed a trend towards failure (HR 6.66, p = 0.07). Complications included stent extrusion (n = 28.2%), punctal granuloma (n = 5.1%) and stent exposure (n = 2.5%). The mode of injury – road traffic accidents and type of stent - 20 G silicone rod were risk factors predictive of poorer outcome after canalicular laceration repair. Individual skill of operating surgeon may be a critical factor suggesting a review of training protocols.

14. Ganguly A, Jain S, **Singh S**, Rath S. Primary Non-endoscopic Endonasal versus Delayed External Dacryocystorhinostomy in Acute Dacryocystitis. *Ophthal Plast Reconstr Surg* 2016 (Epub).

Conventional treatment for acute dacryocystitis consists of medical management followed by elective delayed external dacryocystorhinostomy (EXT-DCR). The purpose of this study was to compare the outcome after primary nonendoscopic endonasal dacryocystorhinostomy (NEN-DCR) versus conventional treatment in acute dacryocystitis. **METHODS:** Retrospective chart analysis of all consecutive patients of acute dacryocystitis presenting between 2011 and 2015 was performed. Group A had patients who underwent primary NEN-DCR within 2 weeks of presentation. Group B comprised age- and gender-matched patients who received conventional treatment. **RESULTS:** Forty-six patients were included with 23 patients in each group. Mean age (45.2 ± 14.7 vs. 47.5 ± 14 years) and gender distribution (women 17/23 in group A vs. 15/23 in group B) in both groups were comparable. Mean duration from presentation to surgery was 7.82 ± 4.65 days for group A versus 27.3 ± 12 days for group B (p = 0.00001, independent T test). Mean time for complete

resolution of symptoms was 21.4 ± 6 days for group A versus 38.69 ± 15.8 for group B ($p = 0.000014$, independent T test). Mitomycin-C usage (0.04%; 17 vs. 14) and mean follow up of both groups (6.4 vs. 5.7 months) were comparable. While functional success was similar (20/23) in both, anatomical success was seen in 22/23 and 21/23 in groups A and B, respectively. Complications included disfiguring scar in 4, recurrent acute dacryocystitis in 3, and punctal ectropion in one patient in the EXT-DCR group. CONCLUSIONS: Primary NEN-DCR leads to faster resolution facilitating earlier rehabilitation with comparable anatomical and functional outcomes compared with conventional delayed EXT-DCR in acute dacryocystitis.

15. **Singh S**, Ali MJ, Naik MN. Lacrimal drainage system involvement in linear scleroderma. *Ophthal Plast Reconstr Surg* 2016 (Epub).

Linear scleroderma is a localized variety of scleroderma characterized by fibrotic areas of the dermis involving head region without systemic features. Ocular involvement has been sparsely reported in the form of episcleritis, dry eye, and uveitis. We describe a 42-year-old man with linear scleroderma, en coup de sabre type with associated nasolacrimal duct obstruction and prolonged dacryocystitis.

16. Ali MJ, **Singh S**, Naik MN, Kaliki S, Dave TV. Interactive Navigation guided Ophthalmic Plastics Surgery: the utility of 3D CT-DCG guided dacryolocalisation in secondary acquired lacrimal duct obstructions. *Clin Ophthalmol* 2016;11:127-133. The aim of this study was to report the preliminary experience with the techniques and utility of navigation-guided, 3D, computed tomography-dacryocystography (CT-DCG) in the management of secondary acquired lacrimal drainage obstructions. METHODS: Stereotactic surgeries using CT-DCG as the intraoperative image-guiding tool were performed in 3 patients. One patient had nasolacrimal duct obstruction (NLDO) following a complete maxillectomy for a sinus malignancy, and the other 2 had NLDO following extensive maxillofacial trauma. All patients underwent a 3D CT-DCG. Image-guided dacryolocalization (IGDL) was performed using the intraoperative image-guided StealthStation™ system in the electromagnetic mode. All patients underwent navigation-guided powered endoscopic dacryocystorhinostomy (DCR). The utility of intraoperative dacryocystographic guidance and the ability to localize the lacrimal drainage system in the altered

endoscopic anatomical milieu were noted. **RESULTS:** Intraoperative geometric localization of the lacrimal sac and the nasolacrimal duct could be easily achieved. Constant orientation of the lacrimal drainage system was possible while navigating in the vicinity of altered endoscopic perilacrimal anatomy. Useful clues with regard to modifications while performing a powered endoscopic DCR could be obtained. Surgeries could be performed with utmost safety and precision, thereby avoiding complications. Detailed preoperative 3D CT-DCG reconstructions with constant intraoperative dacrylocalization were found to be essential for successful outcomes. **CONCLUSION:** The 3D CT-DCG-guided navigation procedure is very useful while performing endoscopic DCRs in cases of secondary acquired and complex NLDOs.

17. Ali MJ, **Singh S**, Naik MN, Kaliki S, Dave TV. Interactive Navigation guided Ophthalmic Plastics Surgery: navigation enabling of telescopes and their use in endoscopic lacrimal surgeries. *Clin Ophthalmol* 2016;10:2319-2324.

PURPOSE: The aims of this study were to report the preliminary experience of using telescopes, which were enabled for navigation guidance, and their utility in complex endoscopic lacrimal surgeries. **METHODS:** Navigation enabling of the telescope was achieved by using the AxiEM™ malleable neuronavigation shunt stylet. Image-guided dacrylocalization was performed in five patients using the intraoperative image-guided StealthStation™ system in the electromagnetic mode. The "look ahead" protocol software was used to assist the surgeon in assessing the intraoperative geometric location of the endoscope and what lies ahead in real time. All patients underwent navigation-guided powered endoscopic dacryocystorhinostomy. The utility of uninterrupted navigation guidance throughout the surgery with the endoscope as the navigating tool was noted. **RESULTS:** Intraoperative geometric localization of the lacrimal sac and the nasolacrimal duct could be easily deciphered. Constant orientation of the lacrimal drainage system and the peri-lacrimal anatomy was possible without the need for repeated point localizations throughout the surgery. The "look ahead" features could accurately alert the surgeon of anatomical structures that exists at 5, 10 and 15 mm in front of the endoscope. Good securing of the shunt stylet with the telescope was found to be essential for constant and accurate navigation. **CONCLUSION:** Navigation-enabled endoscopes provide the surgeon with the advantage of sustained stereotactic anatomical awareness at all times

during the surgery.

18. Ali MJ, **Singh S**, Naik MN. The usefulness of Continuously variable view rigid endoscope in lacrimal surgeries-first intraoperative. *Ophthal Plast Reconstr Surg* 2016;32(6):477-480.

AIMS: The aims of this study were to illustrate the techniques and usefulness of a new rigid, variable-view endoscope in lacrimal surgeries. **METHODS:** A 4-mm continuously variable view rigid endoscope (EndoCAMEleon) was used to assess 4 intraoperative scenarios in lacrimal surgeries. The endoscope offers variable views from 15° to 90° in one single plane while remaining shape invariant. Multiple planes were assessed after changing the direction of the endoscopic shaft. The ease of handling and optical performance was noted in each plane. **RESULTS:** Enhanced visualization over a wide angle range without moving the endoscope was found to be very beneficial intraoperatively. Accurate assessment of extent of cicatrization or synechiae causes of dacryocystorhinostomy failure, monitoring of internal common opening during trephination, and postoperative ostium evaluation was possible with wider and superior visualization. A complete endoscopic overview in one plane without the need of multiple angled endoscopes made the inspections detailed and less time consuming. Because the tip of the endoscope does not move, it was found to be effective in narrow working spaces without causing any collision with the tissues in the vicinity. **CONCLUSION:** Enhanced field of vision, quicker assessment, and ability to optimize visualization in a continuous mode are advantages of using a variable-view endoscope in lacrimal surgeries.

19. **Singh S**, Ali MJ, Naik MN. Familial incomplete punctal canalization: clinical and Fourier Domain Optical coherence tomography features. *Ophthal Plast Reconstr Surg*. 2016 (Epub)

Incomplete punctal canalization is a form of punctal dysgenesis with membranous noncanalization and can be confused with punctalagenesis. The clinical and diagnostic features are known; however, familial incomplete punctal canalization has not been reported earlier. A family with 3 affected members is presented in this series with similar incomplete punctal canalization and nasolacrimal duct obstructions. After

membranotomy and endoscopic dacryocystorhinostomy with bicanalicular intubation, all of them are free of epiphora at last visit.

20. Ali MJ, **Singh S**, Naik MN. Entire Lacrimal Sac within the Ethmoid Sinus: Outcomes of Powered Endoscopic DCR. *Clin Ophthalmol*.2016;10:1199-203.

BACKGROUND: The aim of this study was to report the outcomes of powered endoscopic dacryocystorhinostomy (PEnDCR) in patients with lacrimal sac within the sinus.**MATERIALS AND METHODS:** Retrospective analysis was performed on all patients who underwent PEnDCR and were intraoperatively documented to have complete lacrimal sac in sinus. Data collected included demographics, clinical presentations, associated lacrimal and nasal anomalies, intraoperative findings, intraoperative guidance, complications, postoperative ostium behavior, and anatomical and functional success. A minimum follow-up of 6 months postsurgery was considered for final analysis.**RESULTS:** A total of 17 eyes of 15 patients underwent PEnDCR using standard protocols, but with additional intraoperative guidance where required and careful maneuvering in the ethmoid sinus. The mean age of the patients was 37.2 (range 17-60) years. Of the unilateral cases, 69% (nine of 13) showed left-side predisposition; 80% of patients showed regurgitation on pressure over the lacrimal sac area. Associated lacrimal and nasal anomalies were observed in 13.3% (two of 15) and 40% (six of 15), respectively. At a mean follow-up of 6.6 months, anatomical and functional success were observed in 93.3% (14 of 15). One patient showed failure secondary to cicatricial closure of the ostium. **CONCLUSION:** An entire sac within an ethmoid sinus poses a surgical challenge. Good sinus-surgery training, thorough knowledge of endoscopic anatomy, careful maneuvering, and use of intraoperative navigation guidance result in good outcomes with PEnDCR.

21. Ali MJ, **Singh S**, Naik MN. Long-term outcomes of cruciate marsupialization of intra-nasal cysts in patients with congenital dacryocele. *Int J Pediatr Otorhinolaryngol*. 2016;86:34-6.

OBJECTIVES: To evaluate the long-term outcomes of cruciate marsupialization of intranasal cysts associated with congenital dacryocele.**METHODS:** This is a

retrospective review of 15 patients of dacryoceles with intranasal cysts who underwent cruciate marsupialization of the medial wall of the cyst. Post-operative follow up for a minimum of 9 months was an inclusion criterion for analysis. Data analyzed include demographics, clinical presentations, previous interventions, associated systemic abnormalities, clinical course following marsupialization and recurrences. Primary outcome measures were resolution of the dacryoceles and symptomatic relief from epiphora. **RESULTS:** The mean age at presentation was 1.6 months with a female preponderance (60%). History of prematurity (pre-term) was noted in 20% (3/15). Swelling in the lacrimal sac area (dacryoceles) was the universal presentation. Five patients (33.3%) had a prior conservative treatment. Four patients (26.6%) had respiratory distress with feeding. Acute dacryocystitis was noted in 26.6% (4/15). At a mean follow up of 19.1 months, successful outcomes were achieved in 86.6%. **CONCLUSION:** Cruciate marsupialization of intranasal cysts achieves good results in patients with congenital dacryocel, which are maintained over a long period of time. Early diagnosis and management may prevent acute dacryocystitis in these patients.

22. Successful management of severe unilateral chemical burns in children using simple limbal epithelial transplantation (SLET).

Mittal V, Jain R, Mittal R, Vashist U, Narang P. Br J Ophthalmol. 2016 Aug;100(8):1102-8.

AIM: To study the outcomes of simple limbal epithelial transplantation (SLET) for unilateral total limbal stem cell deficiency (LSCD) secondary to severe ocular surface burns in children.

METHODS: Retrospective interventional case series was performed at a private referral tertiary care centre. Children less than 15 years of age who underwent autologous SLET for total LSCD and had a minimum follow-up of 6 months were included in the study. Demographic and clinical data were recorded in a predesigned form. All patients underwent SLET with a standardised technique. The outcome was defined as complete success (completely epithelialised, avascular corneal surface), partial success (focal recurrence of symblepharon not involving the visual axis) and failure (unstable ocular surface with persistent epithelial defects/symblepharon recurrence involving the visual axis). **RESULTS:** The mean age was 5.75 years (range 2-12). The male to female ratio was 3:1. All eyes (four) presented in the acute phase,

had grade 6 chemical injury (Dua classification) and underwent amniotic membrane transplantation at presentation. The mean interval between initial injury and SLET was 6 months (range 4.5-8). The outcome was complete success and partial success in one-fourth and three-fourths of cases, respectively. The overall follow-up was 12-60 months. Pre-SLET visual acuities were hand motions (one eye) and perception of light (three eyes). Post-SLET visual acuities were counting fingers close to face (one eye), 6/36 (two eyes) and 6/18 (one eye) at final follow-up. Cases with partial success underwent repeat SLET with conjunctival autograft, after which the outcome was complete success in all cases at varied follow-up intervals (13-36 months). CONCLUSIONS: SLET appears to be a promising technique for treatment of LSCD secondary to ocular surface burns in children.

23. Cataract surgery in chronic Stevens-Johnson syndrome: aspects and outcomes.

Narang P, Mohamed A, Mittal V, Sangwan VS. Br J Ophthalmol. 2016.

AIM: To assess the outcome of cataract surgery in patients with chronic sequelae of Stevens-Johnson syndrome (SJS). METHODS: Setting: Tertiary eye care centre in South India. DESIGN: Retrospective, non-comparative, consecutive, interventional case series. Study period: March 2003 to May 2014. Of the 1662 consecutive patients with SJS, 32 patients (40 eyes) with chronic sequelae of SJS who underwent cataract surgery were included. The main outcome measures were best-corrected visual acuity (BCVA) and ocular surface stabilisation. The visual acuity was expressed with reference to the logMAR. RESULTS: The study included 12 men (37.5%) and 20 women (62.5%). 8 patients (25%) had bilateral cataract surgeries. The median preoperative BCVA was 1.61 (IQR, 0.80 to 2.78) (only perception of light in three eyes). The median BCVA in the immediate postoperative period was 0.60 (IQR, 0.30 to 1.48) (perception of light in an eye) which was significantly different from the preoperative BCVA ($p < 0.0001$). The median BCVA achieved was 0.30 (IQR, 0.00 to 0.80), suggesting further improvement. Median time taken to achieve this postoperatively was 1.5 months (IQR, 8 days to 3 months). The median BCVA during the last follow-up was 0.48 (IQR, 0.18 to 1.00). The preferred type of cataract surgery was phacoemulsification. Ocular surface condition remained stable in 35 eyes (87.5%). Ocular surface breakdown in four eyes (10%) was managed appropriately. CONCLUSION: Cataract surgery outcome can be visually rewarding in chronic

sequelae of SJS provided ocular surface integrity is adequately maintained preoperatively and postoperatively.

24. Primary Simple Limbal Epithelial Transplantation Along With Excisional Biopsy in the Management of Extensive Ocular Surface Squamous Neoplasia.

Mittal V, Narang P, Menon V, Mittal R, Honavar S. Cornea. 2016;35(12):1650-1652.

PURPOSE: To describe the utility of simple limbal epithelial transplantation (SLET) along with tumor excision in the management of extensive ocular surface squamous neoplasia (OSSN) to avoid limbal stem cell deficiency (LSCD).

METHODS: This case report describes the management of a 75-year-old man clinically diagnosed with OSSN involving more than 3 quadrants of limbus. The excisional biopsy of tumor along with 4-mm healthy margin led to a complete loss of the limbus, which was restored by limbal epithelial cell transplantation using the SLET technique in the same setting. **RESULTS:** The tumor was found adherent to the episclera in the superotemporal quadrant and required episcleral and superficial lamellar scleral dissection. The entire tumor could be excised, and complete reepithelialization of the cornea was seen within 2 weeks. Histopathology showed tumor cells infiltrating the stroma and base of the excision biopsy, suggesting invasive squamous cell carcinoma. The excised margins were tumor free. To prevent recurrence, the patient underwent radiotherapy (plaque brachytherapy). After a follow-up period of 2 years, a successful outcome in the form of a stable ocular surface, no tumor recurrence, and no signs of LSCD was achieved in our patient. **CONCLUSIONS:** Restoration of limbal stem cells using SLET technique in an extensive OSSN in the primary setting may be pertinent to a good outcome.

25. Autologous simple limbal epithelial transplantation for unilateral limbal stem cell deficiency: multicentre results.

Vazirani J, Ali MH, Sharma N, Gupta N, **Mittal V**, Atallah M, Amescua G, Chowdhury T, Abdala-Figuerola A, Ramirez-Miranda A, Navas A, Graue-Hernández EO, Chodosh J.

Br J Ophthalmol. 2016 Oct;100(10):1416-20. PMID:26817481

PURPOSE: To report outcomes of autologous simple limbal epithelial transplantation (SLET) performed for unilateral limbal stem cell deficiency (LSCD) at multiple centres worldwide. **METHODS:** In this retrospective, multicentre, interventional case series, records of patients who had undergone autologous SLET for unilateral LSCD, with a minimum of 6 months of follow-up, were reviewed. The primary outcome measure was clinical success, defined as a completely epithelised, avascular corneal surface. Kaplan-Meier survival curves were constructed and survival probability was calculated. A Cox proportional hazards analysis was done to assess association of preoperative characteristics with risk of failure. Secondary outcome measures included the percentage of eyes achieving visual acuity of 20/200 or better, percentage of eyes gaining two or more Snellen lines and complications encountered. **RESULTS:** 68 eyes of 68 patients underwent autologous SLET, performed across eight centres in three countries. Clinical success was achieved in 57 cases (83.8%). With a median follow-up of 12 months, survival probability exceeded 80%. Presence of symblepharon (HR 5.8) and simultaneous keratoplasty (HR 10.8) were found to be significantly associated with a risk of failure. 44 eyes (64.7%) achieved a visual acuity of 20/200 or better, and 44 eyes (64.7%) gained two or more Snellen lines. Focal recurrences of pannus were noted in 21 eyes (36.8%) with clinical success. **CONCLUSION:** Autologous SLET is an effective and safe modality for treatment of unilateral LSCD. Clinical success rates and visual acuity improvement are equal to or better than those reported with earlier techniques.

26. Kaur S, Yangzes S, **Singh S**, Sachdev N. Efficacy and safety of topical difluprednate in persistent diabetic macular edema. *Int Ophthalmol*. 2016;36(3):335-340.

To evaluate the efficacy and safety of treatment of diabetic macular edema (persistent type) with difluprednate ophthalmic emulsion 0.05 % (off label use). 20 patients with persistent diabetic macular edema were enrolled. In all subjects, more than 4 months had passed since prior treatment. All patients were treated with difluprednate ophthalmic emulsion 0.05 % three times daily for 3 months. At the end of 3 months the visual acuity had increased by two lines to a mean value of 0.61 ± 0.18 on logMAR from a baseline value of 0.885 ± 0.20 and the central retinal thickness had decreased from 423 ± 72.04 microns to 345 ± 68.7

microns. Hence, there was a total of 18.4 % decrease in retinal thickness on difluprednate. Major side effects included raised intraocular pressure in 20 %. Difluprednate is a potent and strong steroid which causes a rapid decrease in persistent diabetic macular edema. However, the potential side effect of raised intraocular pressure limits its use as an adjuvant therapy in non-steroid responders.

27. Jain S, Ganguly A, **Singh S**, Rath S. Long term outcomes of non-endoscopic endonasal dacryocystorhinostomy in acute dacryocystitis. Indian J Ophthalmol 2016 (Epub).

28. Kaliki S, **Singh S**, Iram S. Interferon alfa 2b for ocular surface squamous neoplasia: A cost-effective alternative to surgery. Indian J Ophthalmol 2016.

The purpose was to study the efficacy of interferon alpha 2b (INF α 2b) in the treatment of ocular surface squamous neoplasia (OSSN) and analyze its cost-effectiveness in India. Study Design: This was a retrospective study of thirty patients with OSSN treated with topical INF α 2b (1 MIU/cc) \pm perilesional INF α 2b (5 MIU/cc). Results: The tumor involved cornea (n = 9, 30%), conjunctivo-limbal-corneal surface (n = 19, 63%), or bulbar conjunctiva (n = 2, 7%). The mean basal dimension of the tumor was 16 mm. The tumors belonged to Tis (n = 6, 20%) or T3 (n = 24, 80%) based on the American Joint Committee Classification, 7th edition. In the six patients with Tis, three cycles of topical INF α 2b were used for immunoprevention. In the remaining 24 patients, INF α 2b was advised for immunoreduction, but served as immunotherapy with 100% tumor regression in 22 (92%) cases, and resulted in 95% immunoreduction in 2 (6%) cases. Complete tumor regression by immunotherapy (n = 22) was achieved with a mean number of three topical INF α 2b cycles and two perilesional injections. All these 22 patients received three additional topical INF α 2b cycles after complete tumor regression. For immunoreduction (n = 2), both patients received six cycles of topical INF α 2b which was three perilesional INF α 2b injections. The mean total treatment cost per patient with INF α 2b was INR 9164 (\$US 137). Based on maximum basal diameter of tumor at presentation, the mean total treatment cost per patient with INF α 2b was INR 4866

(\$US 73) for eyes with microscopic evidence of tumor residue (n = 6), INR 9607 (\$US 143) for tumors ≤ 10 mm (n = 13), and INR 10,985 (\$US 164) for tumors > 10 mm (n = 11), with two patients needing additional surgical excision for complete tumor control. Conclusion: INF $\alpha 2b$ can be used for immunoreduction, immunotherapy, or immunoprevention of OSSN. INF $\alpha 2b$ is a cost-effective treatment modality for OSSN at an average total treatment cost of INR 9164 (\$US 137) per patient.

29. Malhotra C, **Singh S**, Chakma P, Jain AK. Effect of oral omega-3 Fatty Acid supplementation on contrast sensitivity in patients with moderate meibomian gland dysfunction: a prospective placebo-controlled study.

Cornea. 2015;34(6):637-43.

PURPOSE: To evaluate the effect of oral supplementation with omega-3 (ω -3) fatty acids (FAs) in improving contrast sensitivity (CS) of patients with moderate meibomian gland dysfunction (MGD). **METHODS:** In this prospective study, 60 patients with moderate MGD were allocated alternately to treatment and control groups. Both groups received warm compresses, lid massage, and artificial tear substitutes. The treatment group also received oral supplements of 1.2 g ω -3 FAs per day. All parameters were recorded at baseline and at 12 weeks and included Ocular Surface Disease Index scores, CS testing at 3, 6, 12, and 18 cycles per degree (cpd), tear break-up time, Schirmer test I without anesthesia, corneal and conjunctival staining scores, and meibum quality and expressibility. **RESULTS:** At the end of 12 weeks, significant improvement in CS was seen in the treatment group in 7 of the 8 testing conditions (3, 6, 12, and 18 cpd photopic and 6, 12, and 18 cpd mesopic), whereas in the placebo group, significant improvement was seen only in 3 of the 8 testing conditions (3 cpd photopic, 6 and 18 cpd mesopic). Ocular Surface Disease Index, tear break-up time, ocular surface staining, and meibum quality and expressibility improved significantly in both groups, but more so in the treatment group. Schirmer scores showed no significant improvement in either group. **CONCLUSIONS:** Oral supplementation with ω -3 FAs significantly improved CS under both photopic and mesopic testing conditions in patients with moderate MGD. Tear film stability also improved significantly, whereas no effect was seen on aqueous tear production.

30. **Singh S**, Tripathy D. Burrow in the sphenoid: a clue to occult pulmonary tuberculosis. *JAMA Ophthalmol.* 2015;133(10):e151498.

A 20-year old male presented with a chronic, non-healing sinus tethered to the underlying bone in the left upper lid sulcus. CT imaging showed classic changes of chronic osteomyelitis (bony erosion with a scalloped cavity and formation of sequestrum) in the left greater wing of the sphenoid.

31. **Singh S**, Mittal R, Padhan P, Tripathy D. Unilateral Migratory Relapsing Orbital Myositis While on Immunosuppressant Therapy: An Uncommon Entity. *Ophthal Plast Reconstr Surg.* 2015 (Epub)

A young healthy female presented with acute onset left ocular pain, restricted ocular motility, and binocular diplopia. CT imaging showed left lateral rectus myositis that resolved with oral corticosteroids. Two sequential relapses occurred subsequently involving the superior rectus-levator complex followed by the medial rectus. Biopsy revealed orbital inflammatory disease with lymphocytic vasculitis. Detailed systemic work up was normal. The second relapse was seen while on long-term oral methotrexate although initial disease remission had been achieved with the same drug. A changeover to oral azathioprine was able to achieve disease remission after the second relapse. All relapses involved the same side and the contralateral orbit was not affected. This report presents the curious phenomenon of unilateral migratory relapsing orbital myositis of unknown cause that recurred even while on immunosuppressant therapy. It highlights the unpredictable nature of this uncommon entity and the challenges faced in managing such cases.

32. Singh M, **Singh S**, Zadeng Z, Singh U. Merkel Cell Carcinoma of Eyelid: A Rare Clinical Presentation and Diagnostic Challenge. *OJO* 2013;3:16-18.

33. Ocular Surface Epithelialization Pattern After Simple Limbal Epithelial Transplantation: An In Vivo Observational Study. **Mittal V**, Jain R, Mittal R. *Cornea.* 2015;34(10):1227-32.

PURPOSE: To study the in vivo pattern of ocular surface epithelialization after simple limbal epithelial transplantation (SLET). **METHODS:** A retrospective interventional case series was performed at a cornea and anterior segment services of a referral tertiary care center between June 2012 and March 2015. Patients with unilateral limbal stem cell deficiency who underwent SLET and whose medical records had serial and detailed photographic documentation of ocular surface healing were reviewed. The outcome measures consisted of the pattern of ocular surface epithelialization, time taken for complete ocular surface epithelialization, and assessment of the possible variations in the explants' characteristics in vivo. **RESULTS:** Five patients fulfilled the inclusion criteria. Mean age was 30.8 years, the male:female ratio was 4:1. Mean follow-up after the SLET period was 10.8 months. A 2-line improvement in visual acuity was seen in 3 of 5 patients. The mean number of explants was 11.4 (range, 5-19). The first clinical evidence of proliferation of the corneal epithelium from the limbal explants was seen on the second day in all patients, and ocular surface epithelialization was complete in all cases within 14 days. The explants disappeared within 1 to 2 months in all but 1 case (24 weeks). Variations were seen in explant activity with the size and age of the explants. **CONCLUSIONS:** The in vivo pattern of ocular surface epithelialization after SLET appears to be similar to in vitro epithelialization observed after CLET. The observations in this study provide a lead for performing further laboratory and clinical research in SLET.

34. Incidental central tear in Descemet membrane endothelial complex during Descemet membrane endothelial keratoplasty.

Mittal V, Mittal R, Jain R, Sangwan VS. BMJ Case Rep. 2014.

Descemet membrane endothelial keratoplasty (DMEK) was performed in a 70-year-old man diagnosed with pseudophakic bullous keratopathy. During Descemet endothelial complex (DEC) preparation, a central tear was noticed in the DMEK graft. However, the surgery was continued. On sixth postoperative day, a small fluid pocket was observed between the DEC and the posterior host stroma in inferior third of the graft area. It was, however, decided to observe it for spontaneous attachment. At 2 weeks, the inferior DEC detachment had increased with overlying corneal oedema. Descemetopexy with 100% air was performed the same day which reattached the DEC. Subsequently, DEC remained attached and at the last follow-up of 2 months, DEC was well opposed with a clear overlying cornea. The final best-corrected

Snellen's visual acuity was 20/60. A small tear in the DEC does not necessitate tissue replacement and a good anatomical and visual outcome can be achieved in such cases.

35. Challenges in pediatric endothelial keratoplasty.

Mittal V, Mittal R. Indian J Ophthalmol. 2014 Feb;62(2):251-4.

We performed endothelial keratoplasty (EK) in three eyes of two siblings (2.5 years, male and 3.5 years, female) with congenital hereditary endothelial dystrophy (CHED) and report the intraoperative and postoperative difficulties. Repeated iris prolapse, apprehension of crystalline lens touch due to positive vitreous pressure, and need for frequent air injections to attach the graft were intraoperative challenges in all three eyes. These were addressed by use of Sheet's glide instead of Busin's glide during graft insertion and suturing of main and side ports before air injection. One eye had graft dislocation on second postoperative day due to eye rubbing by the child. Graft was repositioned with air and a venting incision was created. Postoperative examination required repeated general anesthesia. Corneal edema resolved completely in all three eyes. Present case series highlights the possible intraoperative and postoperative challenges and their solutions in pediatric EK for CHED.

36. Intracameral and topical voriconazole for fungal corneal endoexudates.

Mittal V, Mittal R. Cornea. 2012 Apr;31(4):366-70.

PURPOSE: To evaluate the role of intracameral and topical voriconazole as treatment for fungal keratitis presenting with endothelial exudates. **METHODS:** Five eyes of 5 patients with fungal keratitis presenting with endoexudates with or without infiltrates in the corneal stroma were included in the study. Intracameral voriconazole 50 mcg/0.1 mL was given followed by topical voriconazole 1% hourly. Main outcome measure was Resolution of endoexudates and corneal stromal infiltrates. **RESULTS:** On presentation, all 5 eyes had endoexudates. Diagnosis of fungal keratitis was based on microbiological analysis of endoexudates (3 eyes) and corneal scrapings (2 eyes). After the intervention, the reduction in the size and density of endoexudates were documented and a complete resolution of the infection was seen in all cases within 3 weeks to 3 months. Two patients experienced burning sensations with topical voriconazole. Best-corrected visual acuity (BCVA) at presentation was hand motions in 3 patients and less than 20/125 in the remaining 2 patients. Final BCVA varied from 20/2000 to 20/40 depending on location of corneal scar. **CONCLUSION:**

Intracameral and topical voriconazole may be effective against deep fungal keratitis presenting with endoexudates.

37. Post-laser in situ keratomileusis interface fungal keratitis.

Mittal V, Jain R, **Mittal R**, Sangwan VS. *Cornea*. 2014 Oct;33(10):1022-30.

PURPOSE: To report outcomes of post-laser in situ keratomileusis (LASIK) interface filamentous fungal keratitis. **METHODS:** This retrospective interventional case series included 6 eyes of 5 patients with microbiologically proven post-LASIK interface fungal keratitis from August 2008 to August 2013. Patients presenting with concurrent bacterial/viral keratitis, systemic illness, prior ocular pathology, or those without a minimum follow-up of 3 months were excluded. Every case underwent microbiological scrapings from residual bed and undersurface of the flap after flap lift at presentation followed by voriconazole interface wash. Flap amputation was performed when required. The outcome measure was complete resolution of infection. **RESULTS:** The mean age was 24 ± 3.1 years. The male:female ratio was 4:1. The mean interval between LASIK and symptom onset was 4.16 ± 2 days; and the mean interval between symptom onset and patient referral was 3.16 ± 1.16 days. Interface scrapings showed filamentous fungal filaments in KOH wet mount. The culture grew *Aspergillus* in case 1 and case 5. Infiltrated LASIK flap needed to be amputated in 4 eyes of 3 patients. Voriconazole wash ($100 \mu\text{g/mL}$) of the stromal bed was performed in all cases. A positive response to therapy with resolution of infection was seen in all cases at a mean of 6.5 ± 4.6 days. No intraoperative or postoperative complications after interface scraping or voriconazole wash were observed. The final best-corrected visual acuity ranged from 20/20 to 20/80 at a mean follow-up of 9.1 ± 6.5 months. **CONCLUSIONS:** Post-LASIK interface fungal filamentous keratitis can present early and gives good outcomes with early microbiological diagnosis and appropriate management. Voriconazole is an efficient and probably safe adjunct in the armamentarium of corneal surgeons to treat such cases.

38. Combined endothelial keratoplasty and clear lens extraction for corneal decompensation in irido-corneal endothelial syndrome.

Mittal V, **Mittal R**, Maheshwari R. *Indian J Ophthalmol*. 2014 May;62(5):651-3.

A 38-year-old woman presented with corneal decompensation in left eye secondary to irido-corneal endothelial (ICE) syndrome. She underwent simultaneous Descemet's

stripping endothelial keratoplasty (DSEK) and clear lens extraction with posterior chamber intraocular lens implantation. The surgery was accomplished comfortably without rupture of peripheral anterior synechiae (PAS). 5 weeks postoperatively, the graft was attached, the cornea was clear and best-corrected visual acuity improved from 20/400 to 20/30. DSEK combined with clear lens extraction appears to be an effective measure to treat corneal decompensation in patients with ICE syndrome. Associated lens extraction in such cases increases the working space in anterior chamber for DSEK, which minimizes the intra-operative graft manipulation. This also avoids a future difficult cataract surgery in the presence of PAS and an endothelial graft, which may increase the chances of graft survival.

39. Oval capsulorhexis for phacoemulsification in posterior polar cataract with preexisting posterior capsule rupture.

Singh K, **Mittal V**, Kaur H. J Cataract Refract Surg. 2011 Jul;37(7):1183-8.

We describe use of an oval capsulorhexis rather than the conventional circular capsulorhexis for phacoemulsification in posterior polar cataract with preexisting posterior capsule rupture. An oval capsulorhexis minimizes the turbulence in the capsular bag by increasing the area available for efflux of fluid. It also enables end-to-end nuclear sculpting, removal of the nuclear fragment from the bag, intraocular lens (IOL) implantation, and vitrectomy without stretching the capsular bag. The smaller axis of the oval capsulorhexis facilitates optic capture of a sulcus-fixated IOL. The oval capsulorhexis can be used safely for phacoemulsification of all grades of nuclear sclerosis in posterior polar cataract with preexisting posterior capsule rupture.

40. Simultaneous bilensectomy and endothelial keratoplasty for angle-supported phakic intraocular lens-induced corneal decompensation.

Mittal V, Mittal R, Singh D. Indian J Ophthalmol. 2011 Jul-Aug;59(4):314-7.

A 40-year-old lady presented with severe endothelial cell loss in both eyes 14 years after angle-supported phakic intraocular lens (AS PIOL) implantation. The left eye had severe corneal edema with bullous keratopathy. The right eye had markedly reduced endothelial cell count (655 cells/mm²) although the cornea was clear. She underwent simultaneous bilensectomy (AS PIOL explantation and phacoemulsification) and Descemet's stripping and endothelial keratoplasty (DSEK)

in the left eye. Explanted AS PIOL was identified as ZSAL-4 (Morcher, Stuttgart, Germany) model. Corneal edema cleared completely in 2 months with a best corrected visual acuity (-2.25 D sph) of 20/60. No intervention was done in the right eye. The present case illustrates that AS PIOL-induced endothelial decompensation can be effectively managed by simultaneous bilensectomy and endothelial keratoplasty.

41. Successful Descemet stripping endothelial keratoplasty in congenital hereditary endothelial dystrophy.

Mittal V, Mittal R, Sangwan VS. Cornea. 2011 Mar;30(3):354-6.

PURPOSE: To report successful Descemet stripping endothelial keratoplasty (DSEK) in a patient with congenital hereditary endothelial dystrophy (CHED). **METHODS:** A 19-year-old boy presented with complaints of decreased vision, hazy corneas, and nystagmus since birth. Six months prior, the right eye had undergone penetrating keratoplasty. In the left eye, he was planned for DSEK. **RESULTS:** Successful Descemet membrane (DM) scoring and stripping was achieved with a reverse Sinskey hook after trypan blue staining. Manually dissected posterior stromal donor tissue was transplanted using Busin glide. Corneal edema resolved completely with a final best-corrected visual acuity of 20/100 at 6 months. Serial anterior segment optical coherence tomography scans showed maximum decrease in stromal thickness in the first month. Despite resolution of corneal edema, mild stromal haze persisted, which decreased with time. Histopathology of removed DM showed thickened DM and absence of endothelial cells which was suggestive of CHED. **CONCLUSIONS:** To the best of our knowledge, this is the first reported case of successful DSEK in a patient with CHED.

42. Voriconazole-refractory fungal infection of phacoemulsification tunnel.

Mittal V, Mittal R, Sharma PC. Indian J Ophthalmol. 2010 Sep-Oct;58(5):434-7.

A 44-year-old man presented 28 days after cataract surgery (phacoemulsification) in right eye with multiple pinpoint infiltrates in posterior stroma at cataract surgery wound site. Visual acuity was 20/60. Corneal scraping from the floor of the corneal tunnel revealed fungus which was later identified to be *Aspergillus flavus*. The patient was started on oral voriconazole 200 mg twice daily and topical voriconazole 1%

every hour. Two intracameral injections of voriconazole (50 micrograms/ 0.1 ml) were given 72 h apart, five days after starting initial therapy. Infiltrates increased in size and density in spite of 20 days of voriconazole therapy. Full-thickness patch graft was done to arrest progressive necrosis. Four months after surgery, patient had 20/60 best-corrected visual acuity. There was no recurrence in one-year follow-up. Present case illustrates the therapeutic challenge in fungal tunnel infections and possibility of voriconazole-resistant *Aspergillus* species.