



Modified Wheeler Technique with Inferior Lid Retractor Plication for Senile Entropion

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ABSTRACT

Introduction: The study aimed to assess the outcome of the modified wheeler technique with lower eyelid retractor plication for the correction of Involutional (senile) entropion among the study patients

Materials and methods: A retrospective case series study was conducted in two tertiary eye hospitals of Bangladesh from 1 July to 31 December, 2020. This study included all patients undergoing modified wheeler technique with inferior lid retractor plication and followed up to at least one year and six months between 01 January 2015 to 31 December, 2019. All patients were suffering from senile entropion of the lower eyelid. All surgeries were performed by a single surgeon and the study sample size was selected purposively. Patients were operated by the modification of modified wheeler technique for the correction of lower eyelid entropion in this study. The outcome of the surgical techniques was assessed at regular intervals on each follow up.

Results: Thirty eyes of thirty patients were evaluated. Success rate was 100% in the 18 months follow up time with no recurrence in any. Ecchymosis, skin scarring and/or minimal pain were observed as post-operative complications.

Conclusion: The modified wheeler technique with inferior eyelid retractor plication is the definitive and permanent procedure for the correction of involutional entropion with minimal or no recurrence.

Key words: Entropion, Inferior lid retractor, Involutional, Modified wheeler, Plication.

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INTRODUCTION

Inward rotation of the eyelid margin from its normal anatomical position is known as entropion. It causes eyelashes to be directed posteriorly towards the globe, which leads to rubbing and irritation of the cornea and conjunctiva (Collin, 2006; Bergstrom and Czyz, 2020). It may be Involutional (senile), spastic, cicatricial, and congenital. Involutional entropion commonly affects the lower eyelid and rarely occurs in the upper eyelid. Involutional changes are the most common cause of lower eyelid entropion due to aging (Collin, 2006; Michels et al, 2014). It may be unilateral or bilateral. If untreated, it may cause ocular symptoms like corneal thinning, vascularization, keratitis, and scarring (Cheung et al., 2018; Chen et al, 2019). The pathogenesis of the involutional entropion is multifactorial and includes horizontal lid laxity, lateral canthal tendon laxity, overriding of pre-septal orbicularis oculi muscle over pre-tarsal orbicularis muscle, and disinsertion or dehiscence of vertical lower lid retractor (Kocaoglu et al, 2009; Marcet et al, 2015; Lin P et al, 2019). Congenital entropion is rare and spastic entropion is usually temporary. Involutional entropion happens as you get old and the treatment is surgical. Cicatricial entropion is not uncommon in oculoplastic practices and usually occur in the upper eyelid due to trauma, burn, trachoma, Stevens-Johnson syndrome (SJS), infection, or inflammation of the eyelid, and rarely found in the inferior eyelid (Cheung et al, 2018). Cicatricial entropion is more complex with multiple causes. Therefore, the treatment of cicatricial entropion depends

on its specific cause and can be harder to treat if it is from pemphigoid and requires a specialist ophthalmic plastic opinion.

A variety of techniques are reported in the literature to correct the involutional entropion. Most of the procedures are unsatisfactory, and recurrences are liable to follow. None of these procedures would likely affect the underlying eyelid laxity. Strengthening of the lower portion of the orbicularis muscle and the operations aimed at correcting a postulated increase in the tone of the pre-tarsal part of the orbicularis relative to the rest of that muscle (Wheeler operation) is favored by many surgeons and is followed by a high rate of cure. Tightening of the deep fascia attached to the inferior border (Jones procedure) with excision of a triangular piece of the tarsal plate and conjunctiva was proposed to treat the involutional entropion. The wedge excision of the tarsus is then combined with the tightening of the skin and muscle of the lower lid through a skin incision below the lateral canthus followed by tightening and reattaching the tarsal plate over the lateral orbital margin (Michels et al, 2014; Mohammed and Ford et al, 2017; Dresner and Karesh, 1993). Everting sutures (ES) technique alone has been considered a temporary option for patients with entropion (Cillino S et al, 2010). ES may be used with other surgical procedures, and the combined techniques may give a higher success rate (Kocaoglu et al, 2009). Non-surgical procedures include taping the lower eyelid which relieves the entropion temporarily. Botulinum toxin type-A injection into the lower



eyelid may temporarily relieve the discomfort from entropion for up to 6 months (Boboridis et al, 2000). This paper aims to assess the outcome of the Modified Wheeler technique with inferior lid retractor plication for senile entropion among the study subjects.

MATERIALS AND METHODS

Our retrospective case series study was carried out in the Sheikh Fazilatunnesa Mujib Eye Hospital and Training Institute, Gopalganj and Bangladesh eye hospital and Institute, Dhaka, Bangladesh. The study received ethical clearance from the Sheikh Fazilatunnesa Mujib Eye Hospital and Training Institute (SFMEHTI), Gopalganj, Bangladesh. The study period was from 01 July 2020 to 31 December, 2020. It included all patients treated by the modified wheeler technique with inferior lid retractor plication for their lower eyelid primary involuntional (senile) entropion from 01 January 2015 to December 2019 in two tertiary eye hospitals. Most of the patients complained of watering and foreign body sensation in the affected eye. All patients were evaluated through clinical history, meticulous clinical examination and necessary investigations to exclude other causes of lacrimation. The lacrimal syringing test was done in all cases to exclude the nasolacrimal duct obstruction. All patients were counseled regarding entropion, treatment options, surgical procedure, and the surgery outcome. All surgeries were done by a single surgeon. Good outcome was defined as a normal eyelid position at resting position and

unable to induce entropion on forceful eyelid closure during the follow up time. Patients were followed up to assess the outcome of entropion correction at postoperative days 1, 2 weeks, three months, six months, 12 months and 18 months. We evaluated every patients' records for pre and postoperative photographs for this study. Patients were assessed at the follow-up period by relieving preoperative symptoms (watering, foreign body sensation, etc.) and observing the restoration of the lower eyelid margin in primary and downward gaze positions. We investigated the postoperative outcome like pain, ecchymosis, skin scarring and recurrences in 18 months followup time. All consecutive cases were included in this study. The data were collected, entered into the MS-excel spreadsheet, and processed for statistical analysis using the SPSS statistical software package, version 15 (SPSS Inc. Chicago, IL, USA).

Surgical Technique: Informed written consent was obtained from all patients. Topical anesthesia with oxybuprocaine (0.4%) was instilled into the conjunctival surface and local subcutaneous anesthesia of 2 ml of 2% lidocaine with 0.0005% epinephrine mixed with 2 ml 0.5% bupivacaine was injected in the lower eyelid in all patients prior to surgery. An infra-ciliary incision just 2 mm below the eyelashes was made to expose the orbicularis oculi muscle and a parallel incision was made about 3 mm and 7 mm below the lid margin. The dissection was made through the orbicularis and a 4 mm wide



Figure 1: Steps of Modified Wheeler technique with Inferior eyelid retractor plication with preoperative picture and restoration of right lower eyelid position after entropion surgery of right lower eyelid.

band of the orbicularis muscle was exposed. The band was divided in the midline, reflected, and a limited amount of pretarsal orbicularis muscle of each side was excised. A limited amount of pre-septal orbicularis muscle was also excised. A triangular-shaped full-thickness tarsectomy with the apex towards the lid margin and base down was made. The tarsus was sutured with 6-0 vicryl and the lower eyelid retractors were

reattached with the anterior surface of the tarsus [Figure-1]. The skin was closed accordingly without trimming it. The surgical time was about 25-30 minutes.

RESULTS

We evaluated 30 eyelids of 30 patients in this study. The mean age was 67.93 ± 7.83 years (Table 1). The minimum age and the maximum

Table 1: Distribution of demographic and clinical profile of the patients.

Parameters		Results: 30 Eyelids	
		No.	%
Age	Age Range (Years)	55-86	
	Mean age \pm SD (Year)	67.93 \pm 7.83	
	95% CI	65.01 to 70.86	
Gender	Male	14	(47%)
	Female	16	(53%)
Entropion-Eyelids	Right lowed Lid	13	(43%)
	Left Lower Lid	17	(57%)
Associated Ocular Diseases	Cataract	17	(56.7%)
	Diabetic Retinopathy	08	(26.7%)
	Glaucoma	04	(13.3%)
	AMD	03	(10%)
Systemic Diseases	DM	22	(73%)
	HTN	25	(83%)
	Cardiac disease	08	(26.7%)
	CKD	02	(6.7%)
	Asthma/COPD	02	(6.7%)
	Others	03	(10%)

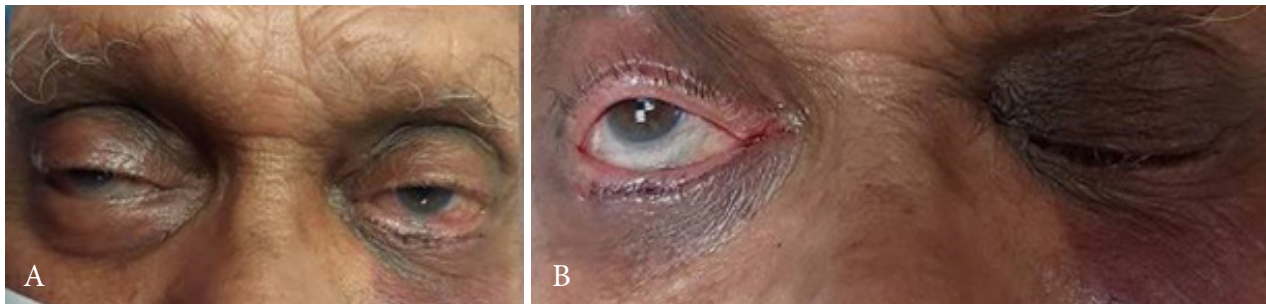


Figure 2: (A) Involitional Entropion of Right Lower Eyelid and 7th POD of entropion correction of left lower eyelid. (B) 1st POD of Modified Wheeler technique with inferior eyelid retractor plication of right lower eyelid.

age were 56 years and 86 years. The number of males was 14 (47%), and females was 16 (53%) in this study. We also assessed the associated ocular diseases. Cataract was observed in 17 cases (56.7%), diabetic retinopathy, glaucoma, and age-related macular degeneration were also found in 15 cases (50%). About ten patients had undergone cataract surgery before presenting with the entropion (33.3%). The past history of trabeculectomy (6.7%), vitreo-retina surgery (10%), and lacrimal drainage system surgery (6.7%) was noted during the evaluation of the patients. Comorbidities like diabetes (73.3%), hypertension (83.3%), cardiac disease (26.7%) and kidney disease (6.7%) were evaluated in the study patients. The right lower eyelid [Figure-2]

was involved in 13 (43%) patients, and the left lower eyelid was involved in 17 patients (57%). Patients had postoperative features like minimal pain (100%) for 3 to 5 days, minimal ecchymosis (20%) for 7-10 days in lower lid skin and minimal skin scarring (3.3%). Punctal ectropion/eversion was observed in 1 patient (3.3%) that was managed by revision surgery. No recurrence was noted in this study. The success rate of entropion correction was 100% in the 18 months follow up times (Table 2). The overall cosmesis was achieved in 96.7% cases and patients were satisfied with their surgical outcome. The symptoms of all patients were utterly alleviated (100%) after two weeks of surgery.

Table 2: Outcome of surgical procedure.

Parameters		Results: 30 Eyelids	
		No.	%
Post-operative Complications	Pain (up to 5 days)	30	(100%)
	Ecchymosis	06	(20%)
	Scarring	01	(3.3%)
	Punctal ectropion	01	(3.3%)
Outcome	Recurrence	00	(0%)
	Success rate	30 eyelids	(100%)

DISCUSSION

Entropion correction is still controversial and depends on the clinical presentation of lower eyelid and underlying pathological factors. Many surgical techniques are available for the correction of entropion. The most common techniques are everting sutures, Weis procedure, Quickert technique, Jones procedure and Lateral tarsal strip (LTS). Various surgical techniques may be needed to achieve a more successful outcome with least recurrence. The lax eyelid requires an increase in tone, so lateral tarsal strip and tarsus resection may be required. Eyelid retractors must be reconnected to the tarsus (Kemp, 2001). Surgical everting sutures are cheap, simple, easy procedures and the sutures can be inserted quickly and often at the patient's first visit to the hospital (SeiV et al, 1989; Wright et al, 1999; Sen and Yalcinsoy, 2020). In our study, the minimum and maximum ages were 55 and 86 years, respectively. The mean age was 67.93 ± 7.83 years and the median age was 67 years. The 95% confidence of interval (CI) was from 65.01 to 70.86 years. The most common risk factor of involutional entropion was ageing. Most of the patients were in the 7th decade of life. The elderly age is most vulnerable for the chances of developing entropion (Marcet et al, 2015). Females (57%) were more affected than males (43%) in this study, and the result was similar to another study (Cai J et al, 2021). It is thought to occur more frequently in women than men because of women having smaller tarsus than men (Bergstrom and Czyz, 2020; Damasceno

et al, 2011). We assessed the associated ocular diseases of the patients. Among them, cataracts (57%), diabetic retinopathy (26.7%), glaucoma (13.3%), and age-related macular degeneration (10%) were evaluated as associated ocular diseases. About 50% of patients gave a history of previous ocular surgeries like cataract surgery (33.3%), trabeculectomy (6.7%) or vitreoretinal surgery (10%) and lacrimal drainage system surgery (6.7%). Systemic diseases like diabetes (73.3%), hypertension (83.3%), cardiac disease (26.7%), and kidney disease (96.7%) were more common in the study subjects. Modified Wheeler Technique with inferior eyelid retractor plication to the tarsus (Triangular tarsectomy, limited myectomy with lower eyelid plication procedure) addresses the correction of horizontal laxity, making a scar to prevent overriding of preseptal orbicularis muscle, and also plicating the lower eyelid retractor to tarsus which results in high success rate for the treatment of age-related entropion correction. In our study, the recurrence rate was zero (0%), and the success rate was 100% in the 18 months follow-up time. The overall cosmesis (96.7%) was excellent. In one study, the success rate was 96.4% in a mean follow up of 27 months in incision based modified everting sutures (Kemp, 2001). The overall success rate in another study was 93.5% in mini-incisional entropion repair (Wright et al., 1999). Lateral tarsal strip (LTS) procedure or horizontal wedge resection is helpful to address the correction of horizontal lid laxity (Poon et al., 2019). Recurrence was significantly more likely when

horizontal eyelid shortening was not addressed at either primary repair or reoperation. The horizontal laxity may be the main pathogenic factor for senile entropion; surgical correction without horizontal shortening of the eyelid may be responsible for recurrence of entropion (Danks et al, 1998). In one study, The record of recurrence rate was 20% of 90 entropion eyelids in a three year follow up period (Lin P et al., 2019). The recurrences were noted to be 11% to 30% in various techniques for entropion correction (Barnes et al, 2006; Boboridis et al, 2000; Lance & Wilkins, 1991; Jang et al, 2014). Quickert sutures is a simple procedure, but a high recurrence rate of 22% to 58.8% during a mean follow up time from 18 to 34 months has been reported (Meadows et al, 1999; Scheepers et al, 2010). The recurrence rates at 18 months were higher in patients treated with ES+LTS (0%) procedure compared with ES (21%) alone (Green S et al, 2019). Another study reported that the recurrence rate was only 6.90% after 14 months of the lateral tarsal strip (LTS), and the recurrences was 2.94% in the 34 eyelids entropion corrected with Quickert (QK) procedure (Rabinovich et al, 2014; Seiff et al, 1989). The success rate was 100% without any recurrences of entropion in 44 eyelids after lateral tarsal strip with infraciliary sutures

for the correction of involitional entropion (Rougraff et al, 2001). In a study done by Danks et al, 1998, they achieved an excellent outcome after primary entropion surgery in 99% of 180 patients in whom the lower eyelid was shortened compared with 78% of 133 patients in whom the eyelid was not shortened ($P < 0.001$). Serious complications from entropion repair are infrequent, but we found few minimal post-operative complications like minimal pain (100%) for 3 to 5 days, ecchymosis (20%) for 7 to 10 days and minimal skin scarring in the patients. The inferior punctal malposition (eversion) was noted in one case (3.3%) corrected by revision surgery within ten days of the first surgery. The Combined procedure such as modified wheeler technique and inferior lid retractor or everting sutures and the lateral tarsal strip is better than a single procedure alone.

CONCLUSION

The modified wheeler technique with inferior eyelid retractor plication is the definitive and permanent procedure to correct involitional entropion with minimal or no recurrence.



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