

Facilitated Lid Anaesthesia Technique (FLAT)

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Abstract

Aims: Management of chalazia and many other eyelid abnormalities involves surgical procedures performed by most Ophthalmologists in an outpatient setting. A novel but straightforward technique is described, that delivers local infiltration eyelid anaesthesia effectively via a convenient subconjunctival route. This technique, entitled by the authors 'Facilitated Lid Anaesthesia Technique' (FLAT), aims to minimise patient pain during the anaesthetic infiltration, minimise subcutaneous ecchymosis and tissue swelling, and maximise intraoperative analgesia.

Methods: The ocular surface is initially anaesthetised with topical Oxybuprocaine 0.4% or Tetracaine 1% drops. With the upper lid digitally everted, and using a bent 30-gauge needle, 0.5 - 1 mL of Lignocaine 2% and 1:80,000 Adrenaline is injected into the subconjunctival plane through the conjunctiva immediately superior to the tarsoconjunctival junction. For lower lid anaesthesia, the same technique is used but with digital distraction of the lower lid to expose the palpebral conjunctiva immediately inferior to the tarsus.

Results: FLAT has been utilised for over 24 years by three experienced Ocular Plastic surgeons. The technique is easily mastered and appears to have no disadvantages when compared with traditional subcutaneous infiltration. Patients who have had the standard transcutaneous infiltration of local anaesthesia prior to experiencing FLAT often comment on the reduced amount of pain associated with the infiltration, improved intraoperative analgesia and a reduction in the degree of postoperative bruising associated with FLAT.

Conclusion: FLAT is a simple method of delivery of anaesthetic infiltration for eyelid procedures, and has proven not only to be effective, but it also appears to avoid the recognised adverse effects of transcutaneous infiltration anaesthesia, such as immediate pain, inadequate intraoperative analgesia and post-procedural swelling and bruising.

Keywords: FLAT; Chalazia; Eyelid Infiltration Anaesthesia; Improved Analgesia and Haemostasis

Abbreviation

FLAT: Facilitated Lid Anaesthesia Technique

Introduction

Chalazia represent a common condition characterised by chronic lipogranulomatous inflammation resulting from the obstruction of meibomian gland orifices by their retained secretions [1,2]. The incidence of chalazia ranges from 0.2 to 0.7% and commonly occurs in adulthood between the ages of 30 to 50 but can occur at any age [1]. While chalazia typically present as painless but persistent upper or lower eyelid nodules, secondary infection can lead to the development of pain and potential progression to preseptal orbital cellulitis [2].

Multiple treatment modalities have been established for the treatment of chalazia. Conservative management consisting of warm compresses with gentle lid massage has been reported to resolve chalazia in 46% of cases [3]. Failure of these initial conservative measures may prompt the use of intralesional steroid injection which has been reported to resolve chalazia effectively in 61.5 to 84% of cases [3,4]. However, our group does not support this modality of treatment as primary management, and has published accordingly [2].

Traditionally, if such conservative measures have proven unsuccessful, simple lid procedures to treat the chalazion surgically are commonly performed by Ophthalmologists and by some General Practitioners. On incision and curettage of the chalazion, an appropriate amount of lipogranulomatous material may be curetted. If due to fibrosis, a less-than-expected amount of material is curetted, then a chalazion-clamp-on intralesional injection of depot steroid into the surgical site may be implemented to improve the chances of complete resolution [5].

Occasionally, chalazia can develop a secondary cellulitis infection in which case the chalazion is usually exquisitely painful. In such cases, systemic antibiotic therapy should be utilised alongside conservative measures. Only once the acute infective process has resolved, and a nodule of granulomatous and recently infected lid remains, incision, drainage and curettage surgery should be performed [2].

Chalazion surgery is the most commonly performed eyelid procedure, with 16,126 procedures recorded in Australia between July 2018 and June 2019 [6]. Once the patient is considered ready for definitive chalazion surgery, the vast majority of older children and almost all adults can be operated on in an outpatient setting [4,7].

Local anaesthesia for the procedure is traditionally carried out by the transcutaneous injection of lignocaine with adrenaline [2,4,7]. Not infrequently, even though the ocular surface has been anaesthetised with topical anaesthetic prior to the injection, the patient experiences significant pain, likely due to local anaesthetic infiltration resulting in skin stretching and stretching within fascicles of the orbicularis oculi muscle. Additionally, the infiltration of the orbicularis oculi muscle involving the abundant palpebral vasculature not infrequently results in the patient developing a postoperative preseptal haematoma, with associated excessive postoperative lid swelling [7,8].

The Facilitated Lid Anaesthesia Technique (FLAT) described in this paper was brought to our attention by one of the authors (BL) in 2000. As a matter of translational surgical intervention, this author considered that transconjunctival infiltration of the eyelid could be useful and effective in preparation for a Hughes flap lid reconstructive procedure, and in his practice, is routinely used for posterior approach blepharoptosis surgery and thyroid-related eyelid retraction surgery [9]. In a Hughes procedure, the paramarginal tarsoconjunctival advancement flap from the upper lid is performed in order to reconstruct a short or longer lower lid defect and is characterised by upper lid lamellar splitting. It was considered that anaesthetising the lamella which houses the neurovascular plane should be a logical way of achieving complete and effective lid anaesthesia for this form of primary eyelid reconstructive surgery. This technique is especially useful in posterior ptosis surgery, reducing the risk of a lid haematoma making surgery more challenging.

The long experience, of over 24 years, of the three senior surgeons in this paper has shown that FLAT is not only straightforward and safe, but highly effective in avoiding the complications of standard transcutaneous local anaesthetic eyelid infiltration injections.

Materials and Methods

The ocular surface is anaesthetised with Oxybuprocaine 0.4% or Tetracaine 1% drops. A 3 mL syringe containing lignocaine 2% and adrenaline 1:80,000 is employed for lid anaesthesia. A 30-gauge or a 32-gauge needle is bent to a 30-degree angle by partially withdrawing the needle from its sheath and bending it mid-shaft by compressing it against the sheath (Figure 1).

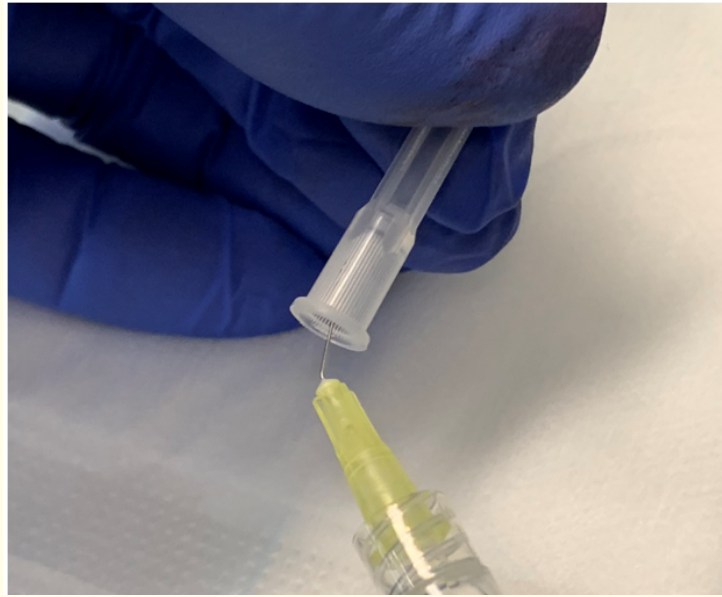


Figure 1: A 30-gauge needle is bent 30 degrees with the assistance of the needle sheath. This bend helps to facilitate the angle of infiltration.

The upper lid is then everted digitally by the surgeon at the fulcrum of the superior tarsal border and held in position (Figure 2A and 2B). This can be facilitated by using the needle, bevel down, facing anteriorly (to the patient and the immediately underlying eye). A volume of 0.5 - 1 mL of local anaesthetic is injected transconjunctivally into the subconjunctival plane, at a point superior to the tarsoconjunctival junction, at the horizontal midpoint of the lid (Figure 3A and 3B). Anaesthetic agent readily diffuses within this subconjunctival plane, towards the fornix, and in both horizontal directions (nasally and temporally).

For the lower lid, simple distraction of the lower lid naturally everts the lid, allowing a direct view of its tarsoconjunctival junction. The bent needle is then used to infiltrate the lid using an approach identical to that for the upper lid (Figure 4).

The bent needle allows the surgeon to rest the injecting hand on the patient's forehead or cheek (for upper lid injections) and cheek (for lower lid injections). If the patient coughs or sneezes, the surgeon's hand holding the needle will travel with the patient head movement and reduce the risk of ocular injury.

Due to the already-anaesthetised conjunctival surface, and the ease of infiltration of anaesthetic agent in the neurovascular plane, the surgeon observes less lid tissue turgor during infiltration. For the patient, this translates to less pain experienced during infiltration,



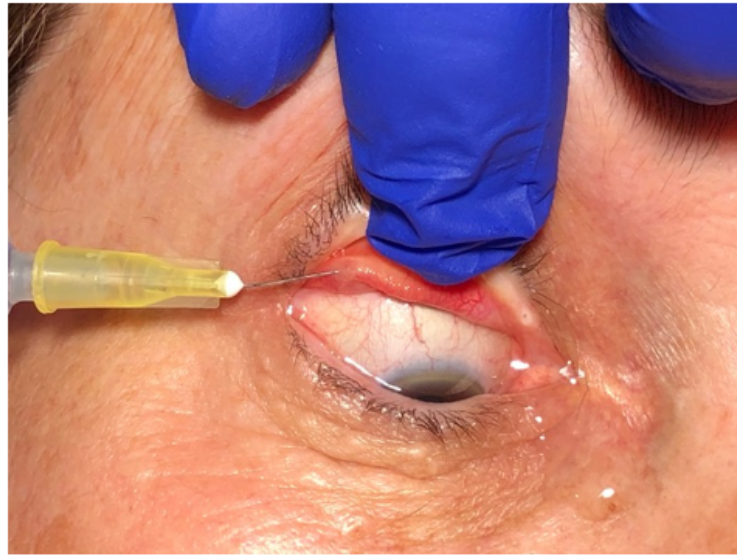
A



B

Figure 2: Upper lid retraction is performed by the needle sheath (A) and the surgeon's thumb and index finger (B).

with less subcutaneous bruising and swelling following the procedure. This is of particular importance in blepharoptosis surgery, as the development of a large haematoma during the time of subconjunctival infiltration, may render it difficult for the surgeon to assess intra-operative lid height.



A



B

Figure 3: A: Infiltration of the upper lid with a 30-gauge needle attached to a 3 ml syringe containing lignocaine 2% and adrenaline 1:80,000. Approximately 1 ml was injected into the subconjunctival plane of the upper lid above the superior border of the tarsal plate.

B: Note the progressive infiltration of anaesthetic agent into the upper lid.



Figure 4: Infiltration of the lower lid with a 30-gauge needle attached to a 3 ml syringe containing lignocaine 2% and adrenaline 1:80,000. Approximately 0.5 - 1 ml was injected into the subconjunctival plane of the lower lid, just below the inferior border of tarsal plate.

The authors always attempt to leave the patient for at least 5 minutes after the local anaesthetic infiltration, as this further facilitates the analgesia and the haemostasis, and minimises the tissue swelling [10]. FLAT is also entirely applicable to patients with marginal chalazia, and in this situation, almost always facilitates a relatively non-haemorrhagic outcome [2].

Confirmation of complete anaesthesia

The supraorbital and supratrochlear nerves innervate the upper lid from the direction of the superior orbital margin. Lid anaesthesia is confirmed, after warning the patient, by testing needle-prick sensation nasal and temporal to the lesion, at the lid margin. This region of lid analgesia thus encompasses the surgical site horizontally and surrounds of the lesion to be operated, guaranteeing no patient distress. Given the superior origin of the upper eyelid nerve supply by the supraorbital, the supratrochlear, the infratrochlear and the lacrimal nerves, then if the lid margin is effectively anaesthetised, the lid tissue further superiorly from the margin will also have been appropriately anaesthetised.

Identically, it can be considered that the infraorbital and infratrochlear nerve supply to the lower lid have also been adequately anaesthetised if needle-prick sensation is absent at the lower lid margin. This again facilitates painless surgery.

Results

FLAT has been utilised for over 24 years by three experienced Ocular Plastic surgeons. The technique is easily mastered and appears to have no disadvantages when compared with traditional subcutaneous infiltration. Patients who have had the standard transcutaneous infiltration of local anaesthesia prior to experiencing FLAT often comment on the reduced amount of pain associated with the infiltration, improved intraoperative analgesia and a reduction in the degree of postoperative bruising associated with FLAT.

Advantage	Mechanism
Minimisation of pain	<ul style="list-style-type: none"> • Topical anaesthetic prior to injection anaesthetises the conjunctiva, through which the 30g needle then passes. • FLAT avoids infiltration of orbicularis oculi which, in transcutaneous injection, may lead to tissue turgor and pain.
Minimisation of bruising	<ul style="list-style-type: none"> • Bleeding is minimised as passage of the needle through the vascular orbicularis oculi and skin is obviated using FLAT. • The above results in more rapid haemostasis and thus, less bruising for the patient, especially as the anaesthetic agent is rapidly infiltrated into the neurovascular plane usually with a single injection.
Rapid onset of anaesthesia	<ul style="list-style-type: none"> • As opposed to waiting for the dispersion of anaesthetic agent across the tarsus in transcutaneous injections, FLAT allows the immediate dispersion of anaesthetic agent within the neurovascular plane.
Less resistance	<ul style="list-style-type: none"> • Infiltration through the conjunctiva into subconjunctival space and neurovascular plane occurs with much less resistance than through the skin and orbicularis muscle themselves.
Decreased number of tissue entries	<ul style="list-style-type: none"> • The dispersion of anaesthetic agent within the neurovascular plane using FLAT, usually at one site only, minimises the tissue trauma of lid infiltration at multiple points along the upper or lower lid if done transcutaneously.
Avoidance of general sedation	<ul style="list-style-type: none"> • Due to the efficacy of FLAT, patients generally do not need additional sedation and the associated extra medical supportive requirements that may be entailed [8].

Table 1: Advantages of FLAT.

FLAT has not been studied in a randomised, prospective, masked, multi-surgeon, international, multi-centre trial. However, the advantages of FLAT to three experienced Ocular plastic surgeons, over more than 24 years, are noteworthy enough that the technique has been embraced by all of them.

While it cannot always be definitively stated that a haematoma will not occur with FLAT, the likely lack of bruising in FLAT further recommends it for patients who have an immediate need for postoperative cosmesis, such as for an impending important social event.

Discussion

There are at least six major advantages to FLAT. These are documented in table 1.

Conclusion

FLAT is a simple method of delivery of anaesthetic agent, allowing its rapid infiltration into the neurovascular plane for eyelid procedures. The technique is not only effective, but also appears to avoid the adverse effects of transcutaneous infiltration anaesthesia, such as immediate pain and post-procedural bruising, and avoids the relatively large volumes of local anaesthesia sometimes required with transcutaneous lid anaesthesia.

Conflicts of Interest

There are no financial interests or conflicts of interest to mention.

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