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Blood loss reduction during laser turbinectomy*

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SUMMARY

The use of a combination of topical and injected anaesthetic and vasoconstrictive agents is widely applied in rhinological practice. To prepare the nose prior to a laser inferior turbinectomy under combined general and local anaesthetic, we routinely spray the nose with 1:1000 epinephrine and inject 2% xylocaine with 1:80.000 epinephrine into each inferior turbinate. With the current climate tending towards evidence based medicine, we were keen to show that our technique of pre-operative nasal preparation was effective.

A randomised, double blind, prospective study was carried out, with patients acting as their own control. We found that the injection of 2% xylocaine with 1:80.000 epinephrine did not confer any additional benefit, in terms of blood loss or post-operative pain, in the treatment of these patients. The inferior turbinate that was injected bled more during the procedure than the non-injected side; there was no difference in post-operative discomfort between the 2 sides.

Key words: anaesthetic, local, blood loss, infiltration, laser turbinectomy, rhinitis

INTRODUCTION

Laser turbinectomy is gaining acceptance as a method of reducing bulky inferior turbinates (Mittelman, 1982; Kawamura, 1993; Lippert, 1997) and the long-term results are promising with minimal intra- or post-operative complications (Lippert, 1998; Lagerholm, 1999), although other methods of turbinate surgery have less side effects (Passali, 1999).

In our department, the Carbon Dioxide laser is routinely used to treat enlarged inferior turbinates associated with allergic or chronic rhinitis.

There are a wide variety of techniques available to prepare the nasal mucosa prior to nasal surgery. Cocaine has traditionally been used to anaesthetise and vasoconstrict the mucosa, but not without complications. Johns et al. (1977) found that 20% of over 2,400 otolaryngologists surveyed had experienced some adverse reaction with intranasal cocaine use. To avoid these potential complications, other topical and injectable preparations are being used pre-operatively in nasal surgery. Lignocaine is regarded as a safer local anaesthetic with less serious side effects than cocaine (Christie, 1976). In a double-blind study, topical spraying of the nasal cavities with 4% lignocaine with 1:1000 epinephrine was as effective as 10% cocaine in reducing the nasal airway resistance (Kasemsuwan et al., 1996).

McClymont (1988) found that 2% xylocaine with 1:80.000 epinephrine gave a superior dry operating field than 3% prilocaine with felypressin 0.03 IU/ml in patients undergoing local anaesthetic nasal surgery.

In our department, to avoid the potential risks of cocaine, patients undergoing inferior turbinate reduction surgery using laser, are routinely sprayed with topical 1:1000 epinephrine via a nasal atomiser. In conjunction with this, their inferior turbinates are injected with 2% xylocaine and 1:80.000 epinephrine for vasoconstriction. On its own 1:1000 epinephrine nasal spray provides extremely effective nasal vasoconstriction for nasal surgery.

This study was designed to see if the addition of an injection of 2% xylocaine with 1:80.000 epinephrine provided any additional improvement in the operative blood loss or post-operative discomfort after routine laser inferior turbinectomy.

MATERIALS AND METHODS

Twenty-three consecutive patients listed for laser turbinectomy to the inferior turbinates under general anaesthetic as day cases were entered into the study. Their ages ranged from 17 to 58 years with a mean of 31 years. There were 10 female and 13 male patients. They all had symptoms of nasal obstruction and were noted to have enlarged inferior turbinates on examination. A diagnosis of allergic rhinitis was made if the serum IgE level to any allergens suspected in the history, tested by radioimmunoassay, was elevated above 50 IU/ml. We accept that some

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patients have symptoms and signs of allergic rhinitis with serum IgE levels below 50 IU/ml, but the false negative rate of this assay is very low. All patients were therefore either diagnosed as having allergic or chronic non-allergic rhinitis. Any patient with infective rhinitis was not included in the study. A 3-month trial period on topical nasal steroids was used and those patients with seasonal allergic rhinitis who responded well to this conservative treatment were not offered surgery. There were 23 patients who did not respond to topical steroids who were entered into the trial.

Patients were excluded from the study if they were having their operation done under local anaesthetic, were undergoing other nasal procedures at the same time, if they had any gross septal deviation or if they had any history of allergy to local anaesthetic. Informed written consent was obtained from patients on the ward before their operation.

Patients were then randomised, via numbers inside an opaque envelope system, to receive a 2.2 ml injection of 2% lignocaine with 1:80.000 epinephrine into either one of their inferior turbinates. This was carried out, by a surgeon who did not perform the operation, using a dental syringe and needle in the anaesthetic room after they had been anaesthetised with a general anaesthetic. Each patient also had both nostrils sprayed with five squirts of 1:1000 epinephrine solution via a manual atomiser. Throughout the preparation of the patient's nose and the operation, their pulse, blood pressure and oxygen saturation were routinely monitored, any change in the vital signs was carefully observed during the injection of the local anaesthetic.

The second surgeon carrying out the operation was not informed of which inferior turbinate had been injected. Ten minutes after the injection, the nostril was cleared of any secretions with a standard nasal sucker. The patients then underwent an inferior laser turbinectomy using a Carbon Dioxide laser, set at 10-watts in continuous, super-pulse mode with a slightly defocused beam. A silastic splint is routinely used in each nostril to protect the nasal septal mucosa during the procedure. The Carbon Dioxide laser beam is directed at the anterior half of the inferior turbinate and multiple areas of the turbinate are treated to reduce the bulkiness of the turbinate.

Using a tracheal suction catheter placed in the post-nasal space and a sputum trap attached between the suction catheter and the suction tubing, the blood loss from each nostril was collected separately. The suction catheter was held in the operated nostril until all bleeding from that nostril had ceased. Screw tops were placed on the sputum trap bottles and an independent assessor recorded the accurate weight of each bottle and its contents. The weight of the bottles was subtracted from the figure obtained to give an exact weight of the blood loss from each nostril. With the other nostril acting as its own control, the blood loss between each nostril was compared as an accurate indicator of the effectiveness of vasoconstrictive techniques. None of the patients required nasal packing following the procedure.

All patients were seen on the ward 3 hours after the operation and they were asked if there was any noticeable difference in pain between each nostril.

Statistical analysis of the results was carried out using the Mann-Whitney *U* test, a p-value of less than 0.05 was considered significant.

Table 1. Blood loss measurements from each nostril.

	Mean weight of suction bottle contents (grams)	Weight range (grams)
Injected side	1.369	0.0 - 2.050
Non-injected side	0.174	0.0 - 0.500

RESULTS

Twelve patients had their right turbinate injected and 11 patients had their left turbinate injected with 2% xylocaine with 1:80.000 epinephrine. There was no recorded change in vital signs during or after the injection of local anaesthetic.

The mean weight of the blood in the sputum trap bottle in the injected side of the nose was 1.369 grams, with a range of 0.0 - 2.050 grams (Table 1). In the non-injected side of the nose, the mean weight of blood in the sputum trap bottle was 0.174 grams, with a range of 0.0 - 0.500 grams (Table 1). Using the Mann-Whitney *U* test to compare the sample results, the difference in the mean bottle weights was significant with a p-value of 0.001. There was no difference in the patients' post-operative sensation of pain between the two nostrils. There was no difference in blood loss between the patients with allergic or chronic non-allergic rhinitis.

DISCUSSION

When performing nasal surgery, the use of topical or injected vasoconstrictors is useful in reducing blood loss during the procedure. For septal surgery the injection of local anaesthetic assists the surgeon in elevating the mucoperichondrium from the septal cartilage and with the addition of a vasoconstrictor is thought to reduce peri-operative bleeding. A variety of vasoconstrictive preparations are currently used. Cocaine has traditionally been used as it readily penetrates the mucous membrane providing very effective surface anaesthesia combined with powerful vasoconstrictive activity (Pearman, 1979). With cocaine being a controlled drug, its storage and handling is inconvenient and subject to fairly tight restrictions. Pharmacologically cocaine can have potentially serious side effects such as tachycardia, hypertension, cardiac arrythmias and a stimulant effect on the central nervous system. A survey of American Plastic Surgeons reported 291 mild reactions, 34 severe reactions and 5 deaths from the use of cocaine for anaesthesia for SMR and rhinoplasty procedures out of a total of 108.000 operations (Feehan et al., 1976). Intranasal injections of local anaesthetic are relatively safe, there is only one serious complication recorded in the literature, a patient who became blind following the intra-

turbinate injection of local anaesthetic (Rettinger and Christ, 1989).

This paper represents the first double blind randomised, controlled trial examining the effect of injected local anaesthetic with vasoconstrictor on the outcome of laser turbinate surgery. Our results clearly show that the addition of a 2% xylocaine with 1:80.000 epinephrine injection resulted in more bleeding from the turbinate during laser turbinectomy. Interestingly, there was no subjective increase in post-operative discomfort in the side of the nose not injected with local anaesthetic. This is in keeping with our own observations that laser turbinectomy is a safe painless procedure under general anaesthetic.

Pharmoclogically, lignocaine is said to be neutral in terms of its action on arterioles. Other non-controlled local anaesthetic agents, including bupivicaine, have marked vasodilatory properties and this probably explains their limited use in nasal surgery. The intention of adding epinephrine is to reduce bleeding it is surprising that in this study the opposite effect was found. We can only postulate that the effect of lignocaine may induce a mild vasodilatory effect on the arterioles of the inferior turbinate, rather than the neutral effect cited in drug company information. A further study looking at topical spraying of lignocaine on the inferior turbinate or saline injection may shed more light on this mechanism of action, in terms of the effect on arterioles or capillaries.

Lippert et al. (1997) stated that an injection of local anaesthetic with a vasoconstrictive agent should be used in conjunction with a topical anaesthetic as the swollen inferior turbinate mucosa has a better absorption of laser light. We found no objective difference with the absorption of the CO_2 laser beam in either inferior turbinate.

During nasal surgery bleeding is a common hindrance. This study demonstrates that after applying topical epinephrine, injecting the turbinates with lignocaine and epinephrine confers no additional benefit in terms of intra-operative bleeding or immediate post-operative discomfort.

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