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KTP-532 laser tonsillectomy – a potential day-case procedure?

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Abstract

We report the results of a prospective pilot study of 54 adult patients undergoing tonsillectomy using the KTP-532 laser, designed to assess whether the technique would facilitate day-case adult tonsillectomy. Subjective and objective assessment at six hours post-operatively showed that only 43 per cent could, in our judgement, have been discharged at this interval. Furthermore, the overall complication rate was 31 per cent with a secondary haemorrhage rate of 19 per cent. We conclude that KTP-532 laser tonsillectomy as performed in this pilot study compares unfavourably with dissection tonsillectomy and we discuss possible reasons for this.

Key words: Laser surgery; Tonsillectomy; Post-operative complications; Day care

Introduction

Several evaluations of day-case tonsillectomy in the United States suggest that it is a safe and acceptable practice (Maniglia *et al.*, 1989; Guida and Mattucci, 1990a and b; Haberman *et al.*, 1990; Helmus *et al.*, 1990). One factor which limits the number of patients who could be discharged the same evening as the tonsillectomy is post-operative pain and hence inability to take oral fluids and food. Since studies suggest that use of the KTP laser is associated with reduced immediate post-operative pain (Oas and Bartels, 1990) it would seem that this technique might allow earlier post-operative discharge. This laser also has the theoretical advantage of providing good haemostasis because of the preferential absorption of its visible blue–green beam by haemoglobin. We therefore undertook a prospective pilot study of 54 adult patients undergoing KTP laser tonsillectomy to see if they would be fit and confident to be discharged at six hours post-operatively, with a view to performing a controlled study of day-case adult laser tonsillectomy.

Patients and methods

Fifty-four consenting, informed, adult patients underwent bilateral laser tonsillectomy. Eighteen were male and 36 female, and their ages ranged from 16 to 51 years. The study included no formal control arm so that learning-curve phenomena could be eliminated as early as possible, given that the laser was only available for one half-day per week. [For the same reason, all except three laser tonsillectomies were performed by two senior registrars (HBW and RMR)].

Tonsillectomy was performed on both sides using the KTP-532 laser (Laserscope) under general anaesthesia. A standard premedication and anaesthetic protocol suitable for day-case surgery was adopted. Oral diclofenac and an anti-emetic were used as pre-medication and propofol and fentanyl used intraoperatively. Parenteral ketorolac was given immediately post-operatively for analgesia, supplemented with papaveretum if necessary for severe pain.

The KTP laser, at 6 to 12W, was used on continuous mode to dissect each tonsil out of its fossa, with the tonsil being pulled medially, in the usual way, to display the margins of the fossa to best advantage. As with any fibre optic laser, defocussing the beam by withdrawing the tip of the probe from the tissue to be lasered improved coagulation, while holding the tip of the probe close to the tissue allowed faster cutting without coagulation. In this way it was possible to coagulate the smaller blood vessels, while larger vessels were cauterized with bipolar diathermy, or occasionally tied if necessary.

Post-operatively patients were encouraged to take oral fluids and mobilize. At six hours post-operatively they were reviewed by the senior house officer on-call using a standard questionnaire. They were asked to assess their pain, activity level, and whether they would feel confident to go home should they be allowed. On the same proforma were also documented objective criteria relevant to the patient's fitness for discharge (Table I). All patients were admitted overnight and discharged the following day

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TABLE I
PROFORMA FOR ASSESSMENT SIX HOURS AFTER LASER TONSILLECTOMY

Patient details		
Date of operation	____ / ____ / ____	
Responses of patient		
Drinking satisfactorily?	[ ] yes	[ ] no
Up and about?	[ ] yes	[ ] no
Has the patient passed urine?	[ ] yes	[ ] no
Pain level (indicate one):	[ ] very severe	
	[ ] quite severe	
	[ ] moderate	
	[ ] mild	
Patient confident to go home?	[ ] yes	[ ] no
Observations		
Temperature	____ °C	
Pulse	____ bpm	
Any abnormality of the tonsillar fossa?	[ ] yes	[ ] no
Any sign of active bleeding?	[ ] yes	[ ] no
Any post-operative complications: (recorded after discharge)		

provided they were fit. A record was kept of any post-operative complications encountered.

Results

Fifty-four patients underwent bilateral laser tonsillectomies (Table II), and the energy expenditure in joules and pain scores were available for these.

Fitness for discharge

If at six hours post-operatively surgeons had been happy to discharge only those patients whose temperature was 37.2°C or less, had no clot or active bleeding in their tonsillar fossae, were up and about, drinking, had only mild or moderate pain and who felt confident to go home, then only 23 patients (43 per cent) would have been discharged (Table III). Even fairly lenient criteria allowing any patients who were up and about, drinking and whose pain was mild or moderate to be discharged would prevent 50 per cent from being allowed home at six hours post-operatively.

Complications

Of the 54 laser tonsillectomy patients, 17 developed complications (31 per cent):

(1) Two patients had primary post-operative haemorrhages noted at six hours or less post-operatively and which stopped spontaneously and did not require further surgery. They did however both suffer secondary haemorrhages which were not severe and were managed with intravenous antibiotics.

(2) Ten patients in total (19 per cent) had secondary haemorrhages at intervals of between two and 10 days. This included the two patients mentioned in (1). None of these

TABLE II
RESULTS OF PATIENTS' QUESTIONNAIRES AT SIX HOURS POST-OPERATIVELY (N = 54)

	Yes	No
Drinking satisfactorily	40 (74%)	14 (26%)
Up and about	35 (65%)	19 (35%)
Passed urine	35 (65%)	19 (35%)
Apyrexial	48 (89%)	6 (11%)
Temperature below 37.3 °C	50 (93%)	4 (7%)
Tonsillar fossae normal	49 (91%)	5 (9%)
Confident to go home	31 (57%)	23 (43%)
Pain	Mild or moderate 43 (80%)	Severe or very severe 11 (20%)

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TABLE III

TABLE SHOWING PERCENTAGES OF PATIENTS SATISFYING VARIOUS POTENTIAL DISCHARGE CRITERIA (N = 54)

Up and about, drinking, with only mild/moderate pain	+	+	+	+
Temperature <37.3°C with normal tonsillar fossae	+	+		
Confident to be discharged	+		+	
Number (%) able to be discharged	23 (43%)	26 (48%)	24 (44%)	27 (50%)

Key: + = criterion met; Shading = criterion not met.

was severe or required surgical intervention, but as a precaution, all but two were readmitted for intravenous antibiotics.

(3) Three patients suffered with pain on swallowing between two and five days post-operatively which was severe enough to justify readmission. The pain settled after intravenous antibiotics.

(4) One patient suffered a small burn to the tongue which was asymptomatic.

(5) Two patients returned complaining of some pain and altered taste. This was attributed to neurapraxia of the lingual nerve.

(6) One patient experienced a hypotensive bradycardic episode 30 minutes post-operatively. He remained fully conscious but was treated with atropine. This episode was considered to be a complication of the general anaesthetic, unrelated to the tonsillectomy which was otherwise uneventful.

In view of the unexpectedly high rate of haemorrhagic complications, a review of the case notes of conventional tonsillectomies was subsequently performed (64 patients) which demonstrated a primary haemorrhage rate of 1.5 per cent (one patient) and a secondary haemorrhage rate of six per cent (four patients). One patient presented with pain after four days and was treated with antibiotics.

Predictors for complications

The pain scores (ranging from 1–4, i.e. from 'mild' to 'very severe'), and the total joules used per case were analysed for the 54 patients. The patients were divided into three groups:

Group A = those with secondary haemorrhage (equivalent to (2) in the previous section; n = 10);

Group B = those with delayed post-operative pain (equivalent to (3) in the previous section; n =3); and

Group C = the remainder (n = 41).

The analysis of variance technique revealed that there was no significant difference between the means of the joules in the three groups (F = 0.551; d.f. = 2.51; $p>0.10$). To compare the pain scores in the three groups a Kruskal-Wallis test was used. Under the null hypothesis of no difference between the groups the Kruskal-Wallis statistic (adjusted for ties) has approximately a chi-squared distribution with two degress of freedom. The value of the statistic was 0.930, indicating that there was no significant difference between the groups ($p>0.5$).

The value of the Spearman rank correlation coefficient between pain score and joules for the whole population (Groups A, B and C) was found to be −0.0115, which was not statistically different from zero ($p>0.5$).

Confidence to go home six hours post-operatively did not predict for the presence, or absence, of complications. Of those 13 patients who experienced post-operative bleeding or infection, five would have been confident to be discharged at six hours, and eight would not have been.

Complications were spread evenly over time, rather than clustered at the beginning of the study.

Logistics/technical difficulties

Time taken to remove two tonsils varied from one minute 57 seconds to eight minutes 57 seconds of **laser** time. Any brisk bleeding lengthened this time, however, as diathermy or ties would have to be used to dry the field before proceeding with the dissection. Furthermore, setting up the laser and turning it on and off as necessary throughout the procedure took significant added time: we were never able to perform more than five adult tonsillectomies in a three-and-a-half hour list. To achieve greater efficiency, would require an additional circulating nurse to set up the laser between cases. This extra cost, as well as those of consumables such as laser fibres and the depreciation cost of the laser itself, make laser tonsillectomy significantly more expensive than dissection tonsillectomy.

Discussion

These results suggest that the KTP laser as used in this study is unsuitable for adult day-case tonsillectomy because the proportion of patients who, in our opinion, were unfit for discharge at six hours post-operatively was unacceptably high. In addition, the number of post-operative complications in this study was so great that it is questionable whether the technique should be used at all for adults.

Day-case tonsillectomy in children and adults is considered safe and acceptable in North America using both conventional (Maniglia *et al.*, 1989; Guida and Mattucci, 1990 a and b; Haberman *et al.*, 1990; Helmus *et al.*, 1990) and laser (Barron, 1987; Martinez and Akin, 1989) methods but it is infrequently used in this country (Tewary and

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Curry, 1993), perhaps because patients may be less tolerant of potential discomfort at home.

Discharge criteria, other than social factors, are rarely quoted in North American day-case tonsillectomy studies: in one Canadian paediatric study a telephone call on the first post-operative morning revealed only 65 per cent of patients drinking well and as many as 24 per cent vomiting (O'Connor *et al.*, 1990). A large American review quotes patients being treated post-operatively for dehydration with intravenous fluids in the outpatient unit (Colclasure and Graham, 1990), while another review reports 18 patients being sent home nauseated (Helmus *et al.*, 1990). In all these cases patients and parents were reported as being happy with care, but in this country it might be felt to be suboptimal. In the one of the few studies considering adult day-case tonsillectomy (Wagner, 1991), there was a seven per cent admission rate following planned day-case tonsillectomy, which would contravene the Royal College of Surgeons' guidelines for day-case surgery (1992). It is undeniable that if our patients had been nursed on a dedicated day-case unit (as distinct from the general ward), they might have been more effectively encouraged to drink and mobilize and therefore have been readier to go home, but it seems unlikely that this would have raised the proportion of patients who were fit for discharge to an acceptable level.

We were particularly surprised by the post-operative haemorrhage rate of 19 per cent. A rate of less than two per cent is quoted for the CO_2 laser (Barron, 1987; Martinez and Akin, 1989). In view of this finding we retrospectively reviewed our dissection tonsillectomy haemorrhage rate to see if the unit had a higher than normal rate for that procedure. The figure of six per cent compares favourably with a recent study of adult dissection tonsillectomy with review at two weeks which demonstrated a 15 per cent secondary haemorrhage rate (Cook *et al.*, 1992).

It is obviously unsatisfactory to compare a retrospective review with the bleeding rates found in the prospective laser trial, and ideally a prospective comparison with dissection tonsillectomy patients should have been carried out. A particular difference is that the patients participating in the laser tonsillectomy trial were aware of the need for data on complications and a higher proportion of patients may have represented with them than the dissection cases which were retrospectively reviewed. This seems unlikely to account for the disparity between the two groups however, as all patients in our unit were carefully instructed to return if they experienced any post-operatively bleeding.

The learning curve for laser tonsillectomy using a sapphire blade has been estimated as more than 20 cases (Maloney, 1988). Although the two surgeons performing laser tonsillectomy in this study performed only a few more than this each, complications were evenly distributed throughout the study, so we felt this was unlikely to be responsible for the problems encountered.

The slow healing of laser wounds is well established and has been recognized in KTP-laser tonsillectomy (Oas and Bartels, 1990; Stevens, 1990; Strunk and Nicholls, 1990). It is possible that this slow healing and the area of necrosis left by the KTP-532 laser leaves the tonsillar bed more likely to be infected. The benefit of antibiotics after laser tonsillectomy has been described (Linden *et al.*, 1990) and it may be that if we had used antibiotics routinely our complication rate might have been lower. Our results might also have been more favourable if our patient population had included children, and indeed Kaluskar (1993), one of the most active KTP-laser tonsillectomists in the UK, reported that he found paediatric tonsillectomy far more suitable for the laser technique (personal communication).

The results of this pilot study suggest that the anticipated benefits of laser tonsillectomy are difficult to realize. In view of the disadvantages of this technique i.e. high complication rate, cost and inconvenience we do not plan to proceed to a formally-controlled study or to use the KTP-laser routinely for adult tonsillectomy in this unit.

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