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Main Article

Single dose injection snoreplasty: investigation or treatment?

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Abstract

Introduction: Many surgical and nonsurgical procedures have been designed for the treatment of snoring due to palatal flutter. All work in some, but not all, snorers. The difficulty lies in making the definitive diagnosis of palatal flutter as the cause of snoring, and in deciding which patients should undergo which treatment, which in some cases are relatively radical.

Aims: This study aimed to assess the usefulness of injection snoreplasty in differentiating palatal flutter from other forms of snoring. This was done in the hope of determining which patients would benefit from definitive palatal surgery such as uvulopalatopharyngoplasty and laser-assisted uvuloplasty.

Materials: Sixty consecutive patients referred for habitual snoring were treated with sodium tetradycil sulphate during their first consultation visit. No patients were excluded and none refused the treatment. Forty patients received a single 1 ml dose of 1 per cent sodium tetradycil sulphate, and twenty patients received a single 1 ml dose of 3 per cent sodium tetradycil sulphate under topical anaesthesia. Visual analogue snoring scales were completed by the patient and their partner six weeks, three months, six months and 12 months after the procedure.

Results: Forty of the 60 patients showed improvement in snoring and therefore were considered for definitive surgery. Four of the 60 patients found the investigation unpleasant and did not want any further treatment. Of the 40 patients who showed improvement, 29 maintained this at one year. The other 11 underwent uvulopalatopharyngoplasty or laser-assisted palatoplasty. All patients had successful snoring scale outcomes following the surgery.

Conclusion: A significant number of the patients, 62 per cent, were demonstrated to have significant improvement in the short term. Single dose injection snoreplasty seems not only to be an effective investigation but may constitute a safe and simple treatment within the clinic. At the very least, patients in whom the palate appears not to be the problem are prevented from undergoing painful, unpleasant surgery. Our results support the use of injection snoreplasty, both as an investigation and in some patients as a treatment, for habitual snoring.

Key words: Snoring; Palate; Soft; Therapies; Investigational; Surgical Procedures; Operative; Outcome Assessment (Health Care)

Introduction

Loud snoring present on most or all nights is reported by 24–50 per cent of males and 14–30 per cent of females.[1,2] Many procedures have been designed to treat snoring due to palatal flutter, including uvulopalatopharyngoplasty,[3] laser-assisted palatoplasty,[4] cautery-assisted palatal stiffening,[5] radio frequency ablation of the soft palate,[6] mucosal strip uvulectomy[7] and traditional palatoplasty.[8] These procedures all work in some, but not all, snorers. When successful, they also improve patients' quality of life,[9] both for those with simple snoring and those with obstructive sleep apnoea syndrome. The difficulty lies in making the definitive diagnosis of palatal flutter as the cause of snoring, and deciding which patients should undergo which treatment. In some cases, such treatments are relatively radical. It is logical that patients with palatal flutter would benefit from palatal surgery, whereas those with tongue base or other types of snoring would not benefit.

The difficulty in determining which patients have palatal flutter has prompted two areas of investigation: acoustic analysis and sleep nasendoscopy. Acoustic analysis[10] has not found its way into routine clinical practice and remains generally a research tool. Sleep nasendoscopy has been popularised by Pringle and Croft.[11]

However, El-Badowey *et al.*[12] have demonstrated that sleep nasendoscopy is not of value in the management of habitual snoring, as it is a poor predictor

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of favourable outcome from palatal surgery. This leaves some doubt as to whether sleep nasendoscopy truly demonstrates palatal flutter, or whether the artificial, induced sleep required for the procedure is so different from real sleep that such assessment is not a reliable measure. Other measures of snoring, such as pressure monitoring, have tended to focus more on obstructive sleep apnoea. This procedure could help to localise obstruction and may be applicable in the future for simple snoring.[9] It would seem logical to investigate patients by temporarily stiffening the palate to stop flutter, and then to treat with more permanent surgery only those patients in whom the temporary procedure stops snoring.

Achieving temporary palatal stiffening has been attempted by passing a cord through the nose and pulling the palate forward,[13] and by using an upper dental plate with an attachment to press on the soft palate. Another method is injection of fluids into the palate, for example, the injection snoreplasty technique of Brietzke and Mair.[14] This latter technique appears to be safe and pain-free, and may constitute a treatment when used as multiple injections.

The present study addressed the question of whether this injection snoreplasty technique can be used as an investigation for palatal flutter when administered as a single injection.

Methods and materials

Sixty patients were included in this pilot study, 36 men and 24 women. Their ages ranged from 22 to 72 years and their body mass indexes (BMIs) from 23 to 36. (These BMIs were somewhat low compared with the general population, probably due to the fact that local general practitioners tended not to refer very overweight people with snoring, preferring instead to send them to a dietician.)

A full medical history was taken from all patients, as asthma was considered a contraindication by the manufacturer; none of the 60 patients had asthma. A full ENT examination, including palate and tonsils, was undertaken; gross nasal obstruction requiring surgical attention was excluded. Body mass index, palatal and tonsillar examination results, sleep apnoea, Epworth sleepiness scale results, alcohol intake and smoking were not considered as contraindications, although all patients were given general advice on how these could affect snoring.

The injection snoreplasty procedure was explained in detail and a consent form signed.

Statistical analysis was undertaken using 'the simplest statistical test'.[15]

Injection snoreplasty procedure

Lignocaine spray was used on the palate (xylocaine 1 per cent). Three minutes later, a 1 ml injection of 1 per cent (10 mg/ml) or 3 per cent (30 mg/ml) sodium tetradecyl sulphate (Fibro-vein; C P Pharmaceutical Products Limited, Wrexham, United Kingdom) was given into the midline of the soft palate, 1 cm above the junction of the soft palate and the uvula. The sodium tetradycil sulphate concentration used was random, as the hospital pharmacy supplied 3 per cent or 1 per cent solutions on different days; either was considered to be adequeate. After the procedure, patients were asked to wait 20 minutes in the clinic before going home. Their first review was six weeks later.

As there were no definitive, standardised, internationally accepted snoring scales reported in the literature, we reviewed the functional outcomes of a number of assessments. These were the sleep questionnaire,[16] the symptoms of nocturnal obstruction and related events questionnaire,[17] the snoring symptom index,[18] several quality of life questionnaires, and, the most commonly used, a visual analogue scale or its digital equivalent. For ease of analysis, we used a questionnaire with a simple five point scale (i.e. 1, snoring, 2, disappeared, 3, better, 4, same, 5, worse). Patients were given this simple questionnaire at the first visit and then six weeks, three months, six months and 12 months after the procedure.

Results

Forty patients received a 1 per cent sodium tetradycil sulphate injection. Of these, two patients (5 per cent) reported that their snoring had disappeared completely 12 months after the injection, and 25 patients (62.5 per cent) reported improvement (confirmed by the fact that their partners were no longer sleeping in a separate room). Twelve patients (30 per cent) reported that their snoring was the same, and one patient (2.5 per cent) reported worsened snoring (Table I).

Twenty patients received a 3 per cent sodium tetradycil sulphate injection. Of these, no patient reported that their snoring had worsened, 12 (60 per cent) reported an improvement and eight (40 per cent) reported no change (Table I). Table II shows sleep apnoea.

At 12 month review, there appeared to be no difference between patients who had received 1 per cent and 3 per cent sodium tetradycil sulphate.

Patients were also asked whether their sleep had improved since the injection. Twenty-seven patients (45 per cent) reported that it had, 15 (25 per cent) reported that it had not, and 18 (30 per cent) did not know (Table II).

Patients' BMIs had not changed over the one year of the study; although there had been temporary

TABLE I

SNORING OUTCOMES

Snoring outcome	Patients	
	n	%
*1% STD**		
Disappeared	2	5
Improved	25	62.5
No change	12	30
Worsened	1	2.5
3% STD†		
Disappeared	0	0
Improved	12	60
No change	8	40
Worsened	0	0

*$n = 40$; †$n = 20$. STD = sodium tetradycil sulphate

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TABLE II

SLEEP OUTCOMES*

Sleep outcome	Patients	
	n	%
Improved	27	45
No change	15	25
Don't know	18	30

improvements, patients had returned to their original BMI eventually.

The BMI results of both sodium tetradycil sulphate concentration groups were combined, and the BMIs of the 'failed' patients at six weeks (39 per cent) and at 12 months (52 per cent) were compared with those of the 'successful' patients at the same time intervals (61 and 48 per cent, respectively). There was a nonsignificant trend towards higher BMI and higher Epworth Sleepiness Scale (ESS) in the Failed group at six weeks but no statistically significant difference ($p > 0.02$). At one year, however, this trend had disappeared.

Ten patients (16.6 per cent) reported no side effects of the injection at all. The main side effects were a feeling of a lump in the throat for a few days afterwards, reported by 28 patients (46.7 per cent), and mild discomfort on swallowing, reported by 16 patients (26.7 per cent). Three patients (5 per cent) reported an ulcer in the throat lasting for three days, and two patients (3.3 per cent) fainted two hours after the injection, an incident attributed to the procedure. One patient (1.7 per cent) reported severe ear pain (Table III). When asked whether they would undergo the injection again, 54 patients (90 per cent) said yes, four (6.7 per cent) said no and two (3.3 per cent) did not know (Table IV).

Eleven patients experienced initial resolution of their snoring, but one year later their snoring had returned to pre-injection levels (Table V). These patients were listed for laser-assisted palatoplasty or uvulopalatopharyngoplasty. The decision between the two procedures was made based on whether large tonsils were present or not. The eleven patients all underwent successful palatal surgery one year after their injection snoreplasty.

Discussion

It is often difficult to determine which patients will benefit from palatal surgery. All palatal surgery stiffens the palate in some way and therefore reduces palatal flutter. There is currently no investigation available to differentiate patients for whom palatal surgery has a high chance of success. In the future, acoustic analysis seems likely to be the best method, but at present it remains a research tool, and sleep nasendoscopy does not stand up to rigid testing.

We used single dose injection snoreplasty as an investigation to temporarily stiffen the palate, in order to determine which patients had palatal flutter. This was done in an effort to better select patients for uvulopalatopharyngoplasty or laser-assisted uvuloplasty. Interestingly, some patients only needed a little stiffening; in these patients, the investigation became the treatment. Patients requiring substantial palatal stiffening gained some benefit from the injection but the effect was short-lived, lasting one year at most. All of these latter patients gained further benefit from more radical treatment, either uvulopalatopharyngoplasty or laser-assisted palatoplasty. A third group showed no benefit from temporary stiffening and were thought to be inappropriate for palatal surgery. These patients were further investigated for tongue base, epiglottic or global collapse snoring. Surprisingly, patients' BMI and failure did not differ between the three groups. It could be argued that if some patients gained temporary benefit from a single dose of injection snoreplasty, then further doses should be given to the failures. This theory is currently under investigation, with second and third injections of 3 per cent sodium tetradycil sulphate being used, and will be the subject of a further report.

Although there was no deliberate randomisation of patients to receive either 3 per cent or 1 per cent sodium tetradycil sulphate, we assessed the two groups separately with respect to side effects and efficacy (Tables I and III). Interestingly, the 1 per cent dosage (67.5 per cent failure) was slightly more

TABLE III

SIDE EFFECTS*

Side effect	Patients	
	n	%
Lump in throat	28	46.7
Mild discomfort on swallowing	16	26.7
Ulcer in throat lasting ≤3 days	3	5
Fainting 2 h after injection	2	3.3
Otalgia	1	1.7

*Reported by 50 patients. H = hours

TABLE IV

PATIENTS' RESPONSES TO 'WOULD YOU CHOOSE TO HAVE THE INJECTION AGAIN'?

Response	Patients	
	n	%
Yes	54	90
No	4	6.7
Don't know	2	3.3

TABLE V

POST-INJECTION CHANGE IN SNORING IMPROVEMENT

Time point	Patients with no change	
	n	%
6 weeks	38	61
3 months	39	62
6 months	40	60
12 months	29	48

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efficacious than the 3 per cent dosage (60 per cent failure). However, this difference was not statistically significant.

- **This paper examined the role of injections to the soft palate (snoreplasty) in separating palatal causes from other causes of snoring**
- **The technique used sodium tetradycil sulphate injected under local anaesthetic; results were assessed using a visual analogue scale over the succeeding 12 months**
- **Single dose injections seemed to differentiate palatal snorers from others and to provide a safe, simple, ambulatory treatment for one-third of the patients treated: those who relapsed went on to have successful conventional surgical treatment**

A number of questions remain to be answered. If injection snoreplasty improves snoring but does not eliminate it, should more radical treatment be undertaken? If injection snoreplasty improves snoring but the snoring later returns, it appears that one such treatment in these patients could achieve what from the patient's perspective is a good, albeit only year-long, result. How long the improvement may be maintained is not known, nor whether any other factors (e.g. tonsil size or palatal anatomy) could influence the outcome.

Conclusion

In this investigation, our original intent was to use single dose injection snoreplasty to decide which patients should be listed for more radical surgery. However, a significant number of patients (62 per cent) demonstrated significant improvement in the short term. This technique seems not only to constitute an investigation but also, perhaps, a safe, simple, clinic-based treatment for many patients. At the very least, its use prevented patients without palate-related snoring from undergoing painful, unpleasant surgery. Injection snoreplasty appears to be useful, both in investigation and, in some patients, as a treatment for habitual snoring.

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