

Quality of life outcome analysis in patients undergoing submandibular duct repositioning surgery for sialorrhoea

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Abstract

Bilateral submandibular duct transposition is one of several surgical methods described to control sialorrhoea in the paediatric patient. The purpose of this study is to assess the effect of submandibular duct repositioning surgery on the quality of life of children using the Glasgow Benefit Inventory outcome measure. Consecutive children who underwent submandibular duct repositioning surgery were invited to participate in the study. The parents or guardians of children who gave consent were interviewed. The carer's opinion of the change in salivation, responses to the items in the Glasgow Benefit Inventory score and report of the complications were recorded.

Nine children aged two and a half to 16 years were studied. The mean follow-up time was four years. The mean Glasgow Benefit Inventory score of +33 related to the procedure demonstrates that submandibular duct repositioning leads to a substantial measurable improvement in the quality of life (QoL) of the drooling child.

Key words: Sialorrhoea, Salivary Ducts, Submandibular Gland, Glasgow Benefit Inventory

Introduction

Drooling or sialorrhoea is a medical condition, seen more commonly in the neurologically impaired. It causes great distress to both patients and their carers. Various surgical procedures have been described to control sialorrhoea. Bilateral submandibular duct transposition is one of several surgical methods described to control sialorrhoea in the paediatric patient.¹

Sialorrhoea is hyper-salivation or difficulty retaining or swallowing secretions in the mouth. Drooling is common during infancy. Conditions associated with drooling include cerebral palsy, stroke, mental retardation, Bell's palsy and seizure disorders.^{2,3} Control of sialorrhoea can be achieved by different treatment modalities. These include medical treatment, physiotherapy, radiation therapy and surgery.⁴ Medical management with anti-cholinergics has undesirable side effects. Urinary retention, loss of visual accommodation, headache and dryness of the eyes can occur.⁴ With time patients may require higher doses with an increase in side effects. Radiation therapy causes atrophy of the salivary glands, with a decrease in secretions. However, it carries the risk of malignant transformation.⁵ Botulinum toxin A injection to the salivary glands has been used to treat sialorrhoea. The neuro-glandular junction blockage achieved lasts for 12 to 16 weeks. Repeat injections are required.⁶

Surgical procedures such as bilateral tympanic neurectomy, submandibular duct transposition, parotid duct re-routing and sublingual gland excision have been described to minimise drooling. Bilateral tympanic neurectomy interrupts the efferent parasympathetic nervous supply to the salivary glands. Reduction in salivary secretions is achieved with later glandular atrophy.⁷ The difficulty with nerve resection is that all the secretory nerve fibres may not have been resected. Mullins *et al.* followed up 31 patients, two years post-tympanic neurectomy for sialorrhoea. Seventy-four per cent had improvement in drooling, the effect falling off within one year.⁸

There are no reports that analyse the effect of submandibular duct re-routing using validated quality of life outcome measures. The Glasgow Benefit Inventory is a validated post-interventional questionnaire applicable to otolaryngological procedures which measures changes in health status.⁹ The 18 questions address health related aspects of general, total psychological, social and physical well being. The Glasgow Benefit Inventory measurements range from –100 to +100, with a zero score indicating no change and +100 maximum benefit. The aim of our study is to determine the impact on QoL of submandibular duct re-routing for sialorrhoea, using the Glasgow Benefit Inventory QoL outcome measure.

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Materials and methods

Children who underwent submandibular duct repositioning, at the Royal Aberdeen Children's Hospital for treatment of sialorrhoea between 1996 to 2001 were identified from a prospective operative database and the theatre operative log. The parents or guardians of children who gave consent were interviewed between February and March 2002 using the Bailey and Wadsworth criteria of improvement² and the Glasgow Benefit Inventory⁹ to quantify the health benefit of treatment.

The carers of the patients were mailed information concerning the study aims, consent material and the follow-up questionnaires, and later contacted by phone to record their responses. The questions included both those contained in the Glasgow Benefit Inventory questionnaire and the Bailey and Wadsworth criteria of improvement questions. The Bailey and Wadsworth criteria are categorised as 'much better', 'better', 'no change' or 'worse'. The carer's opinion of the change in salivation, post-intervention and reports of any complications were recorded.

Results

Nine children aged two and a half to 16 years, with a mean age of eight and a half years, underwent submandibular duct repositioning between 1996 and 2001. All parents or carers contacted agreed to be interviewed. Seven of the nine children had underlying medical problems. Two children each had cerebral palsy, developmental delay or motor skills disorder. One child suffered from perennial rhinitis and asthma. Five patients had a bilateral procedure. Two underwent submandibular duct repositioning on the right side and two on the left. The mean follow-up time was four years (range 0.6–5.9 years, Table I).

In six patients, salivation was much better and one patient was better post submandibular duct repositioning surgery. Hence seven (78 per cent) out of nine patients (Figure 1) had an improvement in their symptoms (Bailey & Wadsworth criteria). Two patients experienced no change in sialorrhoea. The mean Glasgow Benefit Inventory Total score

was +33.02, with a general health subscale score of +46.7, social support subscale score +5.5 and the physical health subscale scoring of +5.5. The four patients who underwent unilateral duct transposition had a mean total Glasgow Benefit Inventory score of +54.16 and the five who underwent bilateral surgery +16.11.

One of the two patients, with no improvement after submandibular duct repositioning who underwent bilateral submandibular gland excision was included in our Glasgow Benefit Inventory analysis. It is possible that further surgery may have influenced the responses but excluding this child with a poor outcome would have led to an unrealistically high success rating.

The only complication was post-operative swelling in the floor of the mouth after left submandibular duct repositioning in one child that subsided with antibiotics.

Discussion

Submandibular duct transposition in theory redirects the flow of saliva without affecting production. Conlon and O'Dwyer¹⁰ reported success rates of 94 per cent, and Burton *et al.* showed improvement in sialorrhoea in 85 per cent.³ Redirecting the flow of saliva would improve the problem of drooling without affecting the taste or normal production of saliva. The potential untoward effects of submandibular duct repositioning are xerostomia, ranula formation, dental decay, duct atresia, fistulation and infections.^{11,12}

Most authors have used their own designed questionnaires to assess the outcome of sialorrhoea surgery, reducing the ability to undertake comparative analysis of different surgical techniques.^{1,8,10,13} Bailey and Wadsworth criteria of improvement² reported surgical outcome as 'much better', 'better', 'no change' or 'worse'. In this study, the Bailey and Wadsworth criteria were utilised to allow comparison with previous surgical series.^{2,3} However, the aim of this study was to quantify the health benefit achieved in patients undergoing submandibular duct repositioning and to allow comparison with other otolaryngological procedures.

TABLE I
FOLLOW-UP TIMES AND OUTCOME FROM SUBMANDIBULAR DUCT REPOSITIONING USING BAILEY AND WADSWORTH
CRITERIA OF IMPROVEMENT AND GLASGOW BENEFIT INVENTORY SCORES

Patient no.	Submand. Duct reposition	Bailey & Wadsworth criteria	GBI total score	Follow up in years	Further surgery
1	Right	Much better	+41.66	3.7	No
2	Bilateral	Much better	+55.55	5.7	No
3	Bilateral	Much better	+41.66	0.6	No
4	Right	Much better	+50	3.3	No
5	Bilateral	No change	0	3.3	Yes
6	Left	Much better	+58.33	4.4	No
7	Left	Much better	+66.66	5.1	No
8	Bilateral	Better	0	5.9	No
9	Bilateral	No change	-16.66	4.2	No
Means			+33.02	4.0	

GBI = Glasgow Benefit Inventory

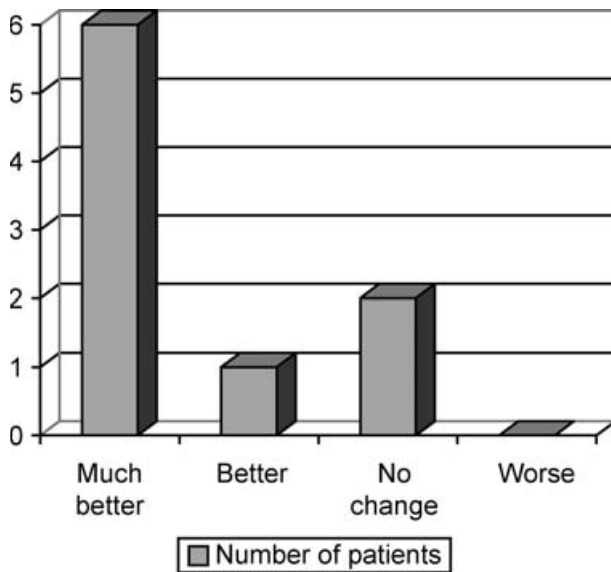


FIG. 1

Chart demonstrating outcome of submandibular duct repositioning using Bailey and Wadsworth criteria of improvement.

Therefore the Glasgow Benefit Inventory was the main outcome measure.

- **Bilateral submandibular duct transposition is one of several surgical methods described to control sialorrhoea in the paediatric patient**
- **This study seeks to assess the effect of submandibular duct repositioning surgery on the QoL of children using the Glasgow Benefit Inventory outcome measure**
- **Submandibular duct repositioning is a safe procedure, which leads to a substantial measurable improvement in the QoL of the drooling child**

Unilateral repositioning was undertaken in four of the patients but subgroup analysis of the Glasgow Benefit Inventory scores is not recommended in this small sample and was not the aim of this study. Bilateral duct repositioning should be associated with better outcomes but the effect of individual patient factors such as severity of motor developmental delay is likely to dominate in small samples, as illustrated by patient six who underwent the most surgery, that is bilateral duct repositioning followed by bilateral submandibular sialadenectomy, experiencing the least benefit in the series. Overall the present study demonstrated a significant improvement in health status after submandibular duct repositioning, with a total benefit score of +33.02. This is comparable to the benefit associated with different surgical procedures, evaluated using the Glasgow Benefit Inventory previously. (Table II).^{9,14,15}

The time delay between the surgery and completion of the Glasgow Benefit Inventory does not reduce the reliability of this study's findings.

TABLE II
GLASGOW BENEFIT INVENTORY SCORES FOR DIFFERENT
OTOLARYNGOLOGY PROCEDURES

Procedure	GBI Total Score	Study reference
Submandibular duct reposition	+33.02	Syeda <i>et al.</i>
Middle-ear surgery for hearing	+34	Robinson <i>et al.</i> ⁹
Middle-ear surgery for activity	+17	Robinson <i>et al.</i> ⁹
Adult tonsillectomy	+27.1	Bhattacharya <i>et al.</i> ¹⁴
Palatoplasty	+22.4	Banerjee <i>et al.</i> ¹⁵
Septoplasty	+23.8	Konstantinidis <i>et al.</i> ¹⁶

GBI = Glasgow Benefit Inventory

Robinson *et al.*⁹ reported a mean time to interview after middle-ear surgery of four years with a standard deviation of three years and Konstantinidis *et al.* interviewed patients two to three years after septal surgery.¹⁶ The former authors, who were instrumental in the development of the inventory, stated that the findings were independent of the number of years between surgery and completion of the inventory.⁹ Furthermore, the high level of satisfaction reported by carers in the current study, on average four years after submandibular duct repositioning, is in agreement with previous reports of the benefit from this operation when carers are assessed by questionnaire even up to 15 years after the procedure.^{10,13}

Conclusions

Submandibular duct repositioning is a safe procedure, which leads to a substantial measurable improvement in the QoL of the drooling child.

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