ARTICLE

Use of Tissue Sealant for Day Surgery Parotidectomy

Peter Conboy, MB ChB and Dale H. Brown, MB ChB

ABSTRACT

Objectives: **To evaluate the use of tissue sealant in facilitating day surgery parotidectomy without the use of surgical drains and to consider the potential economic benefit using this technique.**

Study Design and Setting: **Prospective cohort study of 21 patients undergoing parotidectomy for nonmalignant disease in a university hospital. Surgery as a day procedure without the use of surgical drains was planned. The costs associated with parotidectomy, including the use of tissue sealant and its delivery system, versus in-patient admission with a drain were calculated and compared.**

Methods and Outcome Measures: **Parotidectomy was undertaken by one surgeon. Prior to wound closure, the skin flap and wound bed were approximated using Tisseel tissue sealant (Baxter Corp., Mississauga, ON). Data regarding the costs of the tissue sealant, the delivery system, and hospital in-patient stay were obtained to enable an economic comparison. Patients were followed to assess surgical outcome and document any complications.**

Results: **There were no major surgical complications. One patient required admission for control of postoperative nausea. None of the patients felt that discharge had been premature. The estimated cost advantage of this technique applied to institutions in Canada was $1775 per case.**

Conclusions: **Parotidectomy can be undertaken safely in a day surgery setting without the need for surgical drains. The increased cost associated with the use of tissue sealant compared with surgical drains is greatly overshadowed by the economic advantage of undertaking day surgery. There is a significant potential cost saving to the health care system.**

SOMMAIRE

Objectifs: **Évaluer l'utilisation de scellant tissulaire pour faciliter la parotidectomie en chirurgie d'un jour sans l'utilisation de drains chirurgicaux et de considérer les bénéfices économiques potentiels liés à cette technique.**

Devis et localisation: **Une étude de cohorte prospective de 21 patients subissant une parotidectomie pour une maladie non cancéreuse dans un hôpital universitaire. Nous avions prévu les cas en chirurgie d'un jour sans l'utilisation de drains. Nous avons calculé et comparé les coûts associés à la parotidectomie, incluant l'utilisation de scellant et son système d'application versus une admission hospitalière avec drains.**

Méthodes et les variables évaluées: **Les parotidectomies ont été pratiquées par un seul chirurgien. Avant la fermeture, le lambeau de peau et la plaie ont été rapprochés avec du Tisseel (Baxter Corp., Mississauga, ON). Les données en ce qui concerne les coûts du scellant, son système d'application et l'hospitalisation ont été obtenues pour permettre comparaison du point de vue économique.**

Résultats: **Il n'y a pas eu de complications chirurgicales majeures. Un patient a dû être hospitalisé pour des nausées post-opératoire. Aucun des patients n'a estimé que le départ avait été prématuré. Les avantages estimés des coûts de cette technique appliquée aux établissements au Canada étaient de $1775 par cas.**

Conclusions: **La parotidectomie peut être faite sans risque en chirurgie d'un jour sans le besoin de drains chirurgicaux. L'augmentation des coûts associée à l'utilisation du scellant tissulaire comparés aux drains chirurgicaux est considérablement éclipsée par les avantages économiques associés à la chirurgie d'un jour. Il y a là une économie potentielle de coûts significative pour le système de santé.**

Key words: *cost analysis, day surgery, parotidectomy, tissue glue*

Peter Conboy and Dale Brown: *Department of Otolaryngology, Head and Neck Surgery, University of Toronto, University Health Network, Toronto, Ontario.*

Presented in part at the Canadian Society of Otolaryngology-Head and Neck Surgery meeting. Quebec City, May 2004.

Address reprint requests to: Dale H. Brown, MB ChB, *Department of Otolaryngology, Head and Neck Surgery, Wharton Head and Neck Centre, Princess Margaret Hospital, 3-952 610 University Avenue, Toronto, ON M5G 2M9; e-mail: dale.brown@uhn.on.ca.*

DOI 10.2310/7070.2008.0040

Tissue glues are being used more frequently in a wide variety of surgeries. Fibrin glue aids hemostasis by mirroring the final common pathway of the coagulation cascade and facilitates close apposition of surfaces for healing. Exact apposition of wound edges promotes improved cosmetic outcomes. With new techniques comes the opportunity to consider alternative postoperative management approaches with specific surgical procedures. In the case of parotid surgery, it is possible to consider using tissue glues to replace the need for surgical drains. Without surgical drains, the need for planned admission overnight for monitoring of drainage and associated nursing care issues can be reconsidered. This prospective study evaluates the use of tissue glue in parotid surgery. Specific consideration is given to the economic benefits of planned day surgery compared with parotidectomy as a planned overnight admission procedure.

Materials and Methods

A prospective and consecutive cohort of 21 patients underwent parotidectomy with facial nerve preservation (without neck dissection) by the senior author (D.H.B.) between June 2003 and January 2004 at the University Health Network, Toronto. In this cohort, 19 patients underwent superficial parotidectomy and 2 had a total parotidectomy. Primary surgery was undertaken in 20 patients and revision surgery in 1 of the total parotidectomy cases. The cohort consisted of 9 males and 12 females with a median age of 50.2 years (range 30–78 years). All of these patients had a presumed benign disease process based on clinical findings and investigations, including fine-needle aspiration cytology and imaging. The surgery was planned as day surgery without the use of surgical drains.

A standard, modified Blair parotidectomy incision was used for each patient. A superficial musculoaponeurotic system platysmal flap was raised. The parotidectomy procedure was performed in a standard fashion. Following excision of the lesion, meticulous hemostasis was obtained. Several resorbable sutures were placed to facilitate deep layer closure at the skin incision site but left untied. A slow-setting mixture of fibrin tissue glue (Tisseel, Baxter Corp., Mississauga, ON) was prepared according to the manufacturer's instructions. The preparation used contains 4 IU/mL of human thrombin with an estimated setting time of 60 to 90 seconds. One milliliter of the fibrin glue was applied to the wound bed, which was sufficient to cover an area of 25 to 100 cm^2. The glue was delivered to the area by a spray device (Duploject spray set and Tissomat spray device, Baxter Corp.). The skin flap was reapproximated to the wound bed, and sustained pressure was applied for 5 minutes. During this time, the previously placed deep skin incision sutures were tied. The superficial skin was then closed using a running absorbable suture. No drain was used, and no ongoing pressure dressings were applied. The patients were reviewed 4 hours after their surgery and discharged from the hospital provided that there were no reasons to delay their discharge. Patients were followed to assess surgical outcome and document any complications. Patients were initially reviewed 10 days after their surgery or sooner at their request. Any complications were documented, as well as their experiences regarding the surgery. The mean follow-up period was 15 months (range 5–22 months).

Data regarding hospital costs in our institution were obtained from the finance department. Information on the costs associated with hospital stay (both daycare and in-patient), surgical drains, and the use of tissue sealant was obtained to allow a comparison of the cost differences arising. Patients were reviewed 10 days after their surgery or sooner at their request. Any complications were documented, as well as their experiences regarding the surgery.

The provincial health ministry of Ontario supplied data regarding the number of parotidectomies with facial nerve preservation undertaken in the 2002-2003 fiscal year. The 2003-2004 data were not selected because of the impact of severe acute respiratory syndrome (SARS) on admissions for elective surgical procedures.

Results

The relative cost of day surgery parotidectomy at our institution compared with parotidectomy, including a one-night hospital admission, is 39%. These figures cover the costs associated with the bed, nursing, medicines, and operating room but exclude surgery and anesthesia billing. The cost of a surgical drain is 30% that of the tissue sealant and spray device. The costs of surgical drains and tissue sealant form only 1.3% and 4.4% of the cost of the hospital episode cost, respectively. The overall cost saving of parotidectomy as a day procedure (using tissue glue without surgical drainage) compared with an in-patient procedure (using surgical drainage without tissue sealant) is $1775.

In the province of Ontario in the 2002-2003 fiscal year, 828 procedures were undertaken, representing a region of approximately 12 million people. Using our institution's costing, the cost saving comparing day surgery using tissue sealant without surgical drains with conventional surgery using a drain with an overnight stay amounts to $1.7 million.

In this cohort, all patients expressed satisfaction with their surgery. No patients felt that discharge had been premature. One patient required overnight admission owing to prolonged nausea after surgery and was discharged uneventfully the following day. Two patients required aspiration of fluid collections of 3 and 5 mL when reviewed routinely in the office. Subsequent review showed no recollection. There were no cases of salivary fistula or prolonged facial weakness.

Discussion

Within the specialty of otolaryngology-head and neck surgery, tissue glue has been used in several situations, including facial plastic surgery,[1] thyroidectomy,[2,3] nasal septal surgery,[4] tonsillectomy,[5] and more complex head and neck surgery.[6–8]

The potential for use of tissue sealant in patients undergoing parotid surgery has been reported in a French cohort of 34 patients (with a same-sized cohort not receiving fibrin tissue glue) by Depondt and colleagues.[9] The patients in the fibrin glue group initially received a surgical drain, a practice that was abandoned during the study. The patients all stayed in hospital at least one night, and all patients had pressure dressings applied that were maintained until the fifth postoperative day. The authors suggested that there were significantly fewer complications in the cohort that received tissue glue and in particular in those patients developing a major hematoma. The numbers in the statistical comparisons were small, and the rate of major hematoma recorded in the non–tissue glue group was high (15%) compared with no major hematomas in the tissue glue cohort, so the statistical result must be viewed with caution. In our study, there were no cases of hematoma. Two recorded cases of small seromas required needle drainage without further problems. A more recent randomized, controlled study compared drainage volumes and the incidence of seromas between a group of patients that received Tisseel to the parotid bed and a group that did not.[10] Maharaj and colleagues concluded that the use of tissue glue significantly decreases both the total drainage volume and the frequency of postoperative seroma. Our study differs in that it challenges the assumption that a surgical drain is required for parotidectomy surgery.

Our objective was not to determine the complication rate in patients using a tissue glue and suture closure method. To confidently report such a rate would require a very large study with hundreds of patients. However, in a cost analysis, it is important to determine the complications that can be expected because some complications can impact on the expected cost savings. With reference to day surgery cost analysis, the most significant complication is when a patient requires overnight admission unexpectedly. No series examining parotid day surgery unplanned admission rates have been published to our knowledge. A study looking at day surgery involving 662 patients undergoing otologic procedures found a 3.9% unplanned admission rate. A further study of 1642 patients having ear, nose, and throat day surgery procedures in a dedicated facility found that the unplanned admission rate was 1.8%. In our series, this rate was 4.8%. If the cost saving is recalculated allowing for this unexpected bed stay, the saving becomes CAN$1675 per patient procedure.

Our estimated cost savings have been calculated from documented costs at the University Health Network. These costs vary widely between institutions, states, and countries. The Organisation for Economic Cooperation and Development has collected data from its 29 member countries.[11] The United States had the highest spending on beds in 1997, with a reported cost of a hospital stay per bed per day of $1204. The comparative bed stay cost in Canada in the same study was less than half the cost in the United States ($539/bed/day).[11] In relative terms based on these figures, the cost of a hospital stay in the United States is 2.23 times more expensive than in Canada. Adjusting our cost saving of CAN$1675 to US dollars based on current exchange rates gives a cost benefit in Canada of approximately $1255. If this figure is now adjusted to reflect the bed cost differences between the United States and Canada, the equivalent cost benefit in the United States would be approximately $2800.

Care must be taken when performing cost-benefit analyses in the context of health economics. Our model is a simple one that does not take account of the impact of freeing up an existing in-patient bed within the hospital by performing day surgery rather than planned admission surgery. Considering an economic model, hospitals tend to operate more efficiently with higher bed occupancy rates and fewer beds.[12] The overall cost-benefit impact on the institution as a whole is therefore less clear. The trend over the past 30 years has been to perform more surgery on a day surgery basis. Medical insurance providers are keen to reduce costs and may have helped drive this trend to increased day surgery through their reimbursement policies of the costs related to hospital stays. This effect is likely to continue as operations that were once considered to need overnight hospital admission begin to be undertaken more routinely as daycare procedures.

Conclusion

Parotidectomy can be undertaken safely in a day surgery setting without the need for surgical drains. The patients do not require early outpatient nursing input for surgical drain removal. The increased cost associated with the use of tissue sealant compared with surgical drains is greatly overshadowed by the economic advantage of undertaking day surgery. Based on this simple cost-benefit analysis, when the total number of parotidectomies performed in any jurisdiction is considered, the yearly cost saving to the health care system is in the order of millions of dollars.

References

1. Anderson KW, Baker SR. Advances in facial rejuvenation surgery. Curr Opin Otolaryngol Head Neck Surg 2003;11:256–60.
2. Matthews TW, Briant TD. The use of fibrin tissue glue in thyroid surgery: resource utilization implications. J Otolaryngol 1991;20: 276–8.
3. Lachachi F, Descottes B, Durand-Fontanier S, et al. The value of fibrin sealant in thyroid surgery without drainage. Int Surg 2000; 85:344–6.
4. Daneshrad P, Chin GY, Rice DH. Fibrin glue prevents complications of septal surgery: findings in a series of 100 patients. Ear Nose Throat J 2003;82:196–7.
5. Viaman M, Eviatar E, Shlamkovich N, Segal S. Effect of modern fibrin glue on bleeding after tonsillectomy and adenoidectomy. Ann Otol Rhinol Laryngol 2003;112:410–4.
6. Kang DR, Leong H, Foss R, et al. Sutureless cartilage graft laryngotracheal reconstruction using fibrin sealant. Arch Otolaryngol Head Neck Surg 1998;124:665–70.
7. Wiseman S, Hicks WJ, Loree T, et al. Fibrin glue-reinforced closure of postlaryngectomy pharyngocutaneous fistula. Am J Otolaryngol 2002;23:368–73.
8. Yoshimura Y, Kondoh T. Treatment of chylous fistula with fibrin glue and clavicular periosteal flap. Brt J Oral Maxillofacial Surg 2002;40:138–9.
9. Depondt J, Koka VN, Nasser T, et al. Use of fibrin glue in parotidectomy closure. Laryngoscope 1996;106:784–7.
10. Maharaj M, Diamond C, Williams D, et al. Tisseel to reduce postparotidectomy wound drainage: randomized, prospective, controlled trial. J Otolaryngol 2006;35:36–9.
11. Organisation for Economic Co-operation and Development. OECD health data 2000: a comparitive analysis of 29 countries. United Nations, New York: OECD; 2000.
12. Gaynor M, Anderson GF. Uncertain demand, the structure of hospital costs, and the cost of empty hospital beds. J Health Econ 1995;14:291–317.