Tisseel to Reduce Postparotidectomy Wound Drainage: Randomized, Prospective, Controlled Trial

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Abstract

Background: Tisseel (Baxter Corp. Ontario, Canada) is a fibrin-based tissue glue that has been widely used to reduce wound drainage, achieve hemostasis, and decrease surgical complications. To date, Tisseel has not been evaluated in a randomized prospective trial for use in parotid surgery.

Objectives: To determine whether the use of Tisseel in parotidectomy decreases postoperative wound drainage, the duration of percutaneous drainage, the length of hospital stay, and the frequency of complications.

Methods: Sixty consecutive parotidectomy patients were randomized into two groups: a group treated with 2 cc of Tisseel prior to wound closure and a control group. Postoperative wound drainage was measured for all patients by blinded hospital staff. The duration of percutaneous drainage, duration of hospital stay, and incidence of complications at the 3-week follow-up were assessed.

Results: A statistically significant difference in total drainage volume ($p < .02$) and frequency of postoperative seroma ($p < .05$) was demonstrated between patients treated with Tisseel prior to wound closure and the control group.

Conclusion: The use of Tisseel in parotidectomy patients prior to wound closure significantly decreases total drainage volume and the frequency of postoperative seroma.

Sommaire

Introduction: le Tisseel (Baxter) est une colle biologique à base de fibrine qui est largement utilisée pour réduire le drainage des plaies, obtenir une hémostase satisfaisante et diminuer les complications chirurgicales. Jusqu'à maintenant par contre, le Tisseel n'a pas été évalué dans une étude prospective à allocation aléatoire pour la chirurgie de la parotide.

Objectif: Déterminer si l'utilisation de Tisseel durant une parotidectomie diminue le drainage post-opératoire, la durée du dit drainage, le séjour hospitalier et la fréquence des complications.

Méthode: Nous avons randomisé en deux groupes 60 patients subissant une parotidectomie en deux groupes : la moitié a été traitée avec 2 ml de Tisseel avant la fermeture des lambeaux, l'autre a servi de groupe contrôle. Le drainage a été évalué par le personnel de l'hôpital qui n'était pas au courant de la manipulation chirurgicale. Nous avons aussi évalué la durée du drainage, le séjour hospitalier et l'incidence de complications 3 semaines après l'intervention.

Résultats: Nous avons noté une différence significative dans le volume total de drainage ($p<.02$) et la fréquence de séromes post-opératoires ($p<.05$) entre le groupe traité avec et sans Tisseel.

Conclusion: L'utilisation de Tisseel juste avant la fermeture de la plaie de parotidectomie diminue le volume total de drainage et la fréquence de séromes.

Key words: drain, fibrin glue, parotid, parotidectomy, seroma, Tisseel, wound drainage

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Parotidectomy is the definitive diagnostic and management procedure for most parotid masses.[1,2] Owing to the rich vascular supply to the parotid area, as well as the possibility of salivary leakage from incised parotid tissue, traditional postoperative management for parotidectomy patients in many institutions includes the use of a percutaneous drain.

Percutaneous drains have a wide spectrum of associated complications, including infection, fistula formation, discomfort, psychosocial impact, and failure sec-

ondary to plugging, resulting in fluid accumulation.[3] In some institutions, the persistence of a percutaneous drain is an indication for a patient to remain admitted postoperatively.[4]

Tisseel is a commercially available fibrin glue product that has been used previously to reduce or eliminate the need for a percutaneous drain in facial cosmetic surgery.[5–8] It is composed of human-derived thrombin and fibrinogen, as well as bovine-derived aprotinin, which function to form a fibrin mesh in vivo independently from the proximal coagulation cascade of either the intrinsic or the extrinsic pathway. This mesh binds host platelets to form a thrombus, which is stable for approximately 10 to 14 days in humans.

Previous retrospective studies have shown a decrease in wound drainage, complication rate, the duration of percutaneous drainage, and the duration of hospital stay in parotidectomy patients treated with Tisseel [9] No prospective randomized studies have examined this issue.

This study was a randomized, prospective, controlled trial with blinded assessment of wound drainage volume, which evaluates the total postoperative wound drainage, duration with a percutaneous drain, duration of hospital stay, and postoperative complication rate in parotidectomy patients with and without the use of Tisseel.

Tisseel Background Information

Tisseel was first used clinically in 1978 and has been licensed for use in Canada since 1985. It is currently used in over 50 countries in a broad spectrum of surgical applications ranging from urology to cardiovascular surgery. There are many indications for its use in various aspects of otolaryngologic surgery.

The Tisseel components are sterilized through a dry heat and vapour heat protocol, and all donors are screened for communicable diseases. To date, there have been no reported or suspected cases of Tisseel-mediated transmission of any communicable diseases, including hepatitis B, hepatitis C, human immunodeficiency virus (HIV), or Creutzfeldt-Jakob disease.[10]

Materials and Methods

Inclusion Criteria

All patients over 18 years of age and planned for superficial or total parotidectomy by one of three surgeons specializing in head and neck surgery were approached and recruited consecutively from August 2002 to December 2003. All patients were required to complete a consent process approved by the University of Alberta Faculty of Medicine and Dentistry Heath Ethics Board.

Exclusion Criteria

Patients were excluded from the study if they had any history of surgery, radiation, or trauma to the neck or parotid area or if they underwent concurrent neck dissection for malignant disease or for any known coagulopathy. Patients with incomplete postoperative data or lost to follow-up could not be included in the final analysis because drainage data could not be entered or confirmed, and study protocol violations were likely.

Randomization

Randomization was done by way of sealed envelopes. Informed consent for study inclusion was obtained prior to surgery. Once intraoperative hemostasis had been achieved, a randomization envelope was opened by the scrub nurse assigning the patient to either the Tisseel or the non-Tisseel group. Randomization was concealed to all involved in the study.

Surgical Protocol

All patients underwent either superficial or toal parotidectomy at the surgeon's discretion, based on the location and extent of the lesion. No lumpectomy or partial parotidectomy procedures were performed. The Tisseel group received 2 cc of Tisseel using the thrombin 500 IU/mL concentration. After preparation according to the manufacturer's specifications, the Tisseel was applied to all surfaces of the surgical bed and tissue flap using the supplied duploject syringe system. The non-Tisseel group received nothing as an alternative. A 7 mm fully perforated percutaneous closed drain was then inserted into the wound bed through a separate stab incision. The wound was closed with Vicryl and Monocryl sutures. The drain was then placed on bulb suction, and the anesthetic was reversed.

Data Collection

The volume of wound drainage was collected and measured by ward nursing staff using a 10 cc syringe every 8 hours starting from the anesthetic stop time as recorded on the operative record. When 10 cc or less of wound drainage was measured for the preceding 8 hours, the drain was removed and the patient was discharged home as soon as reasonably possible. Patients were requested to follow up with their surgeon 3 weeks postoperatively and to contact the surgeon sooner with any concerns.

All drainage volume data, along with the date and time of the procedure, date and time of drain removal, and date and time of discharge from hospital, were recorded on a data sheet in the patient's chart and sent to the study secretary on the patient's discharge home. Nursing staff assessing outcome measures, as well as the patients themselves, were blinded as to group assignments.

Statistical Analysis

Statistical analysis was performed using *SPSS*, version 11.0 for Windows (SPSS Inc., Chicago, IL). Categorical data were analyzed using the chi-square and Fisher

exact tests. The independent-samples *t*-test was used for analyzing continuous data.

Results

Sixty patients were enrolled in the trial. Complete data were available for 50 patients: 28 in the Tisseel group and 22 in the non-Tisseel group. The demographics of study patients are outlined in Table 1. Ten patients (17%) could not be included in the final analysis owing to missing or incomplete data or loss to follow-up (Table 2).

There was no statistically significant difference in the makeup of the two study groups in terms of age, gender, surgeon, hospital site, or procedure performed (superficial or total) (see Table 1). The mean total postoperative wound drainage for the Tisseel group was 41.3 mL compared with a mean volume of 65.3 mL in the non-Tisseel group. This difference was statistically significant, with $p < .02$ (Figure 1). The Tisseel group trended toward decreased duration of postoperative percutaneous drainage with 3.2 8-hour blocks as opposed to 3.8 8-hour blocks for the non-Tisseel group, but this result was not statistically significant (Figure 2). Similarly, there was a trend for the Tisseel group patients to have a shorter hospital admission, with an average stay of 1.4 days compared with 1.6 days for the non-Tisseel group, but, once again, this was not statistically significant (Figure 3).

Five (22.7%) of the non-Tisseel patients had a postoperative seroma that required needle aspiration at the 3-week follow-up date compared with only one (3.6%) patient in the Tisseel group. This result was statistically significant ($p < .05$) (Figure 4). Only one patient in the study had a wound infection. This patient was in the Tisseel group. This result was not statistically significant.

There were no complications with respect to facial nerve function in either group.

Discussion

There are different concentrations of thrombin available for use in Tisseel. The one used in this study is the fast-setting thrombin 500 IU/mL concentration, which functions more as a hemostatic agent and a glue. The thrombin 4 IU/mL concentration takes 1 to 2 minutes to set and functions more as a sealant. Although the thrombin 4 IU/mL concentration has been used successfully in facial cosmetic surgery in the past, the thrombin 500 IU/mL concentration was used in this study because we felt that the instant hemostatic and glue properties were more likely to be effective in the parotidectomy wound bed. In addition, the duploject syringe application method was used because it provides a more controlled and directed application of the Tisseel than the available spray attachment.

With respect to the duration of percutaneous drainage and hospital admission, it is possible that these

Table 1 Patient Demographic Information

	Tisseel	*Non-Tisseel*
Total subjects	28	22
Male	18	11
Female	10	11
Mean age (yr)	50.8	47.6
Hospital 1	5	5
Hospital 2	23	17
Surgeon 1	22	15
Surgeon 2	1	5
Surgeon 3	5	2
Superficial	16	17
Deep	12	5

Table 2 Patient Information for Excluded Patients

	Tisseel	*Non-Tisseel*
Total subjects	2	8
Male	2	3
Female	0	5
Mean age (yr)	46.5	51.0
Hospital 1	1	2
Hospital 2	1	6
Surgeon 1	1	5
Surgeon 2	1	2
Surgeon 3	0	1
Superficial	2	6
Deep	0	2

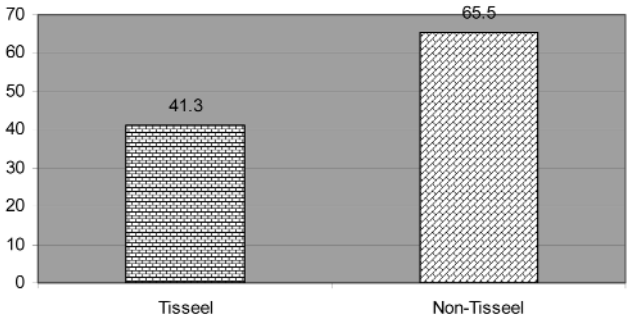

Figure 1 Mean total postoperative wound drainage.

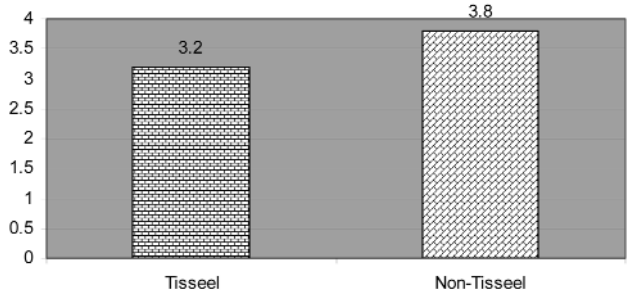

Figure 2 Mean duration of percutaneous drainage (number of 8-hour blocks).

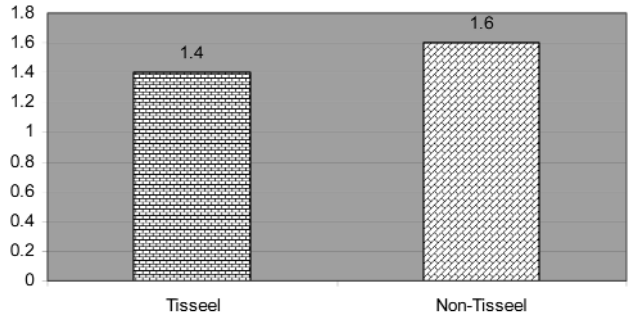

Figure 3 Mean duration of hospital admission.

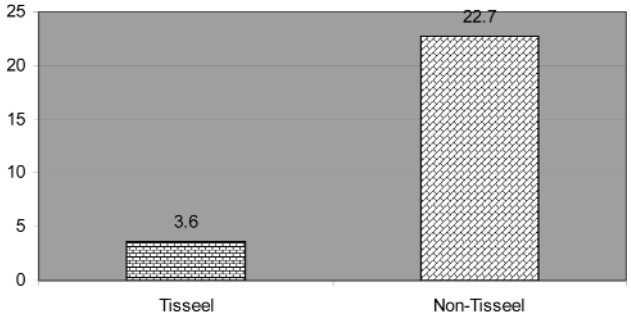

Figure 4 Frequency of postoperative seroma.

nonstatistically significant trends may become statistically significant differences with a larger study group.

The current cost of Tisseel in Canada is approximately $125/mL, bringing the cost for intervention per patient to approximately $250. The decrease in the complication rate demonstrated in this study justifies this cost.

Based on the results of this study, we are planning a randomized controlled clinical trial in which all patients will receive Tisseel following parotidectomy and will be randomized to either having a percutaneous drain or having no drain postoperatively.

Conclusions

The use of Tisseel in parotidectomy patients resulted in a statistically significant decrease in the volume of postoperative wound drainage and the frequency of postoperative seroma.

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