Evaluation of bismuth subgallate and adrenaline paste as haemostat in tonsillectomy bleeding

K. Sharma · D. Kumar · S. Sheemar

Abstract

Haemorrhage is a frequent and often feared complication of tonsillectomy. This has prompted the use of a variety of topical haemostatics such as bismuth subgallate to achieve haemostasis and reduce the risk of postoperative haemorrhage. In this study effect of bismuth subgallate and adrenaline paste was investigated. A total of twenty five subjects undergoing tonsillectomy were randomly recruited. The distinctive feature of study was that each patient constituted a matched pair, with left tonsillar fossa acting as control and right tonsillar fossa as trial side. Bismuth subgallate adrenaline paste was made by mixing 13 gm of Bismuth subgallate powder with 10 ml of normal saline and 0.35 ml of 1: 1000 adrenaline. The application of twin reagent paste resulted in reduced blood loss in trial fosse (60.8 ± 19.3 ml) as compared to control fosse (91.2 ± 20.27) ($p < 0.0001$). Similarly the average number of ligatures applied to control bleeding was also less in trial fosse. Only one patient reported reactionary haemorrhage while there was no report of secondary haemorrhage from amongst tonsillar fosse on trial side. However, two patients presented with secondary haemorrhage from control side fosse.

Keywords Tonsillectomy · haemorrhage · haemostatic agents · bismuth subgallate adrenaline paste

Introduction

Tonsillectomy in spite of all controversies is still most commonly performed surgery and its most frequent and dreaded complication is haemorrhage. A variety of haemostatic agents and specialized surgical techniques have been used in an attempt to reduce the operative and post-operative bleeding. Topical use of astringents such as silver nitrate, tannic acid and diluted adrenaline solution has been advocated for control of post operative bleeding [1].

The use of bismuth subgallate and adrenaline paste can also be used as haemostat in tonsillectomy bleeding. Bismuth Subgallate activates factor XII (Hageman factor) and therefore accelerates the coagulation cascade thus promoting rapid haemostasis [2]. No side or toxic effects of bismuth subgallate with the specific use as a haemostatic agent have been reported in the literature [3].

This prospective study aimed to study the efficacy of bismuth subgallate and adrenaline as topical hemostat in controlling operative and post operative bleeding in tonsillectomy. The use of one of the tonsillar fossa of the subject under going the procedure as a control helped eliminate the bias vis-à-vis age, sex, indication for surgery, status of tonsils, and individual variations in physiological process of homeostasis and type of anesthesia used.

Material and method

Twenty five patients were randomly selected for undergoing tonsillectomy operation. Each patient constituted a matched pair – with left tonsillar fossa in each patient acting as control side and right tonsillar fossa acting as trial side.

About 45 minutes before every surgery bismuth subgallate and adrenaline paste was made by mixing 13 gm of

K. Sharma¹ (✉) · D. Kumar² · S. Sheemar³

¹Associate Professor and Head

²Assistant Professor

³Resident,

ENT Hospital, Govt. Medical College, Amritsar

39-B, Circular Road,

Amritsar - 143 001

Punjab, India

e-mail: drkaransharma2006@yahoo.co.in

Ph: +91 / 183 / 22284777

Fax: +91 / 183 / 2228546,

M: +91 / 9872224441

Table 1 Descriptive statistics comparing intraoperative blood loss and number of ligatures applied in both fosse

Groups	Mean	Standard deviation	p-value
Blood Loss			
- Left fosse (control) non BSG	91.2	20.27	<0.0001
- Right fosse (trial) BSG	60.8	19.31	
Number of ligatures used			
- Left fosse	2.04	1.024	<0.0001
- Right fosse	1.8	1.304	

BSG: *Bismuth subgallate*

bismuth subgallate powder with 10 ml of normal saline and 0.35 ml of 1: 1000 adrenaline as described by Maniglia et al. This yielded a mixture of toothpaste like consistency which is spread generously on the swabs used to pack tonsillar fossa during tonsillectomy [4].

Majority of the patients – 21 – were operated under general anesthesia and rest were taken up under local anaesthesia depending upon subjective preference. Tonsillectomy was performed by blunt dissection and snare method. In order to measure intraoperative haemorrhage, the blood loss from the right and left tonsil from incision to their wire-snare removal was collected in two separate suction containers and the suction tubing washed with 20 ml of hot water. The numbered cotton and gauze balls used were weighed pre and post operatively for both sides separately. Amount of blood loss for each fossa was measured by calculating the difference in weight of swabs before and after use and then adding the total so obtained (1 gm = 1 ml) to the volume of blood collected in the respective suction bottles [5].

Pressure haemostasis with pre-weighed swabs was resorted to on the left side (control) to control immediate bleeding. After that the main bleeding points were ligated with cotton thread and water soaked gauze pack was placed in the fossa. On the right side (trial) after tonsil removal a gauze pack with pre applied bismuth subgallate adrenaline paste was placed. Both the packs were allowed to remain in the fossa for minimum 2 minutes. Each fossa was re-examined, after removal of respective packs, for any persistent bleeding. Necessity of using further ligatures or pressure haemostasis (with pre-weighed swabs) was assessed and resorted to as and when required till complete haemostasis was achieved on each side.

All the patients were followed up on the 7th day, 2nd week and after 1 month of surgery. They were thoroughly examined to see for slough formation and any evidence of postoperative bleeding. The efficacy of bismuth subgallate and adrenaline paste as topical haemostat was judged by the operative surgeon primarily by observing and comparing the following parameters on two sides:

1. Amount of blood loss during haemostasis .
2. Necessity of using other haemorrhage arresting techniques like ligatures/ pressure haemostasis

3. Its role in the prevention/or decrease in incidence of post-operative reactionary and/or secondary bleeding.

Based on these parameters, the operative surgeon labeled the efficacy of bismuth subgallate and adrenaline paste in either of these two categories, effective/not effective.

Results

The study comprised of twenty five patients in the age group of 15–30 years, 60% of them belonged to 15–20 years age group.

The average operative blood loss in control fossa was 91.2 ± 20.27 ml while that in trial fossa was 60.8 ± 19.31 ml. These results were found to be statistically significant ($p < 0.0001$).

In the control fossa average number of ties applied were 2.04 ± 1.024 while that in trial fossa were 1.8 ± 1.304 with $p < 0.0001$ which was found statistically highly significant.

No case had reactionary bleeding in left fossa. However two patients (8%) in the control group reported back after sixth post-operative day with secondary hemorrhage. One case (4%) from the trial group reported minor reactionary bleeding while no patient from this group had secondary hemorrhage.

None of the patients had any hypersensitivity reaction to the constituents of locally applied bismuth subgallate and adrenaline paste.

Discussion

The popularity of the tonsillectomy operation has been a major medical phenomenon of 20th century, reaching a peak in the early 1930's when some 50–75% of all British children lost their tonsils [6].

Mortality associated with this surgery has ranged from 0.5 to 1/10,000 to 1/100,000 primarily because of haemorrhage or respiratory compromise [7,8].

Although the conventional techniques for securing haemostasis like ligation and/or cauterization control the major bleeders yet occasionally the diffuse bleeding and capillary oozing may pose difficulty for the surgeon to locate the bleeders, contribute to inefficient haemostasis and in turn enhance blood loss and operation time

The evaluation of the effect of bismuth subgallate and adrenaline paste on tonsillectomy bleeding or any other surgical procedure has not been widely reported in the available bio-medical literature.

Callanan et al [3] reported an average blood loss of 102 ± 72 ml in the bismuth subgallate group of patients while in the control group it was 130 ± 108 ml. The difference between two sides was 28 ml (21.6%).

Fenton [9] required an average of 1.5 ± 1.07 ties in the bismuth subgallate adrenaline paste group and 3.4 ± 1.65 ties in the control group. In his study 31 out of 39 (79%) patients in the bismuth subgallate adrenaline paste group required ties while in the present study, only 20% cases required any kind of ligature to stop the bleeding.

Sorensen [10] reported an average blood loss of 153 $\pm$ 105 ml in the bismuth subgallate group and 138 $\pm$ 100 ml in the control group.

Hatton [11], concluded that bismuth subgallate and epinephrine paste is inexpensive, poses little risk and may decrease post operative bleeding; therefore, it may be a reasonable haemostatic agent

Agrawal et al [12] in their study reported an average blood loss of 91.3 ± 17.05 ml in the control group while average blood loss was 60.93 ± 20.23 ml in the bismuth subgallate group. The study was able to achieve reduction in tonsillectomy time and operative blood loss which was 33.28 and 53.33%, respectively. All these results are statistically significant.

The present study concluded that local use of bismuth subgallate and adrenaline paste is effective in reducing the incidence of both operative bleeding and secondary haemorrhage and the results came out to be statistically significant with p value <0.0001 . Bismuth subgallate and adrenaline paste was also found to be effective in 96% cases as per assessment of operative surgeon. There was no statistically significant reduction in the number of ligatures applied to control the bleeding in trial and control groups. There was no instance of any hypersensitivity to the constituents of the paste.

Conclusion

The local application of bismuth subgallate and adrenaline paste as a topical haemostat during tonsillectomy operation

is effective in reducing operative blood loss and post operative hemorrhage. There is also a reduction in the requirement of application of ligatures to arrest the bleeding. An overall reduction in operative time has also been reported with the use of bismuth subgallate and adrenaline paste, while no hypersensitivity reactions have been recorded.

References

1. Hill CL (1966) Preliminary report on cryosurgery in Otolaryngology. *Laryngoscope* 76:109
2. Thorisdottir H, Ratnoff OD, Maniglia AJ (1988) Activation of Hageman factor (Factor XII) by bismuth subgallate, a hemostatic agent. *Journal of Laboratory Clinical Medicine* 112(4): 481–486
3. Callanan V, Curran AJ, Smyth DA, Gormley PK (1995) The influence of Bismuth subgallate and adrenaline paste upon operating time and operative blood loss in tonsillectomy. *Journal of Laryngology and Otology* 109(3): 206–208
4. Maniglia AJ, Kushner H, Cozzi L (1989) Adenotonsillectomy. A safe outpatient procedure. *Archives of Otolaryngology Head Neck Surgery* 115(1):92–94
5. Rains JH, Ritchie HD (1981) Measuring blood loss by swab weighing. In: Bailey and Love's Short Practice of Surgery 18th ed. Rains JH and Ritchie HD (Eds). H.K. Lewis and Company Limited, London 72
6. Rosenfeld RM, Green RP (1990) Tonsillectomy and adenoidectomy : Changing trends. *Annals of Otology Rhinology Laryngology* 99:187–191
7. Faigel HC (1966) Tonsillectomy: A bloody mess. *Clinical Paediatrics* 5:652–653
8. Tolczynski B (1969) Tonsillectomy - Its hazards and their prevention. *Eye, Ear Nose, Throat Monthly* 48:378–385
9. Fenton JE, Blayney AW, O'Dwyer TP (1995) Bismuth subgallate –its role in tonsillectomy. *Journal of Laryngology and Otology* 109(3):203–205
10. Sorensen WT, Henrichsen J, Bonding P (1999) Does bismuth subgallate have haemostatic effects in tonsillectomy? *Clinical Otolaryngology Allied Sciences* 24(1): 72–74
11. Hatton RC (2000) Bismuth subgallate epinephrine paste in adenotonsillectomies. *Annals of Pharmacotherapy* 34(4): 522–525
12. Agrawal SR, Jain AK, Marathe D, Agrawal R (2005) The effect of bismuth subgallate as haemostatic agent in tonsillectomy. *Indian Journal of Otolaryngology and Head and Neck Surgery* 57:287–289