

THE BENEFIT OF ALUM IN TONSILLECTOMY

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ABSTRACT

Background: Tonsillectomy is one of the frequent operations performed by Otolaryngologists world over. Otolaryngologists are in search of a technique of tonsillectomy where the operation time and operative blood loss is less. This study was carried out to evaluate the effect of aluminium potassium sulfate on tonsillectomy time, blood loss during the surgery and the number of ties used.

Patients & Methods: A prospective trial of 45 consecutive patients was carried out, in which tonsillectomy was performed using aluminium potassium sulfate (>99% pure) as haemostatic agent on one side and gauze pack on the other side.

Results: Application of aluminium potassium sulfate in the tonsillar fossae reduced the operation time by 28.6%, the operative blood loss by 19.7% and the number of ties used by 33.3% in regard to control side. All these results were statistically significant.

Conclusions: Local application of aluminium potassium sulfate on tonsillar bed in tonsillectomy is beneficial in regard to decreased volume of blood loss, procedure time, and number of ties used.

Key words: Tonsillectomy, Haemostasis, Aluminium potassium sulfate, Alum.

INTRODUCTION

Celsus was the first to recognize tonsillar disease and its relationship to infection, and he performed the first tonsillectomy in 40 AD.¹ The popularity of tonsillectomy peaked in the 1930s, but after the use of antibiotics became widespread, enthusiasm for the procedure waned and its use decreased dramatically by the 1960s. Concerned about the morbidity inherent in the surgical procedure, pediatricians began to question its value relative to medical management with antimicrobials. The tide turned again in the 1980s, when Paradise et al demonstrated that surgery significantly improved patient outcomes compared with medical therapy.² Chronic tonsillitis is one of the most common and frequent illnesses in otolaryngology. Tonsillectomy is also one of the frequently performed surgical procedures. The patients' quality of life and general health is affected by chronic palate and pharyngeal infections.³ Hitherto existing tonsillectomy outcome studies are mostly done on children.^{4,5}

Tonsillectomy occupies significant share in any operation list on a single day at any hospital and reduction in tonsillectomy time will greatly affect the number of surgeries performed within a stipulated time. Most of the tonsillectomy time is spent in achieving haemostasis i.e. putting ligatures. Faster tonsillectomy means increased number of surgeries performed on a single day, which

could be a bonus to the already cramped budget of the hospitals in our country.

Alum (Aluminium potassium sulfate) is a food additive and traditional remedy used to stop superficial bleeding from minor abrasions or cuts. Its astringent properties contribute to its efficacy in the treatment of intravesical haemorrhage caused by prostate and bladder cancer^{6,7} or hemorrhagic cystitis.⁸ Alum can also control haemorrhage from advanced rectal carcinoma⁹ or oesophageal varices.¹⁰ Alum proved to be safe and effective and thus remains the drug of choice for persistent vesical haematuria.¹¹ In addition, mouth rinses containing alum have been shown to reduce dental plaques and can therefore be useful in preventive dentistry.^{12,13}

The aims of this prospective study was to evaluate the effects of aluminium potassium sulfate on tonsillectomy time, operative blood loss and number of ties used to achieve complete haemostasis.

PATIENTS AND METHODS

Forty five patients underwent tonsillectomy were randomly selected, aluminium potassium sulfate (>99% pure) impregnated gauze pack applied to one tonsillar fossa after the tonsil had been removed, the other side no agent was used with pack. Tonsillectomy was performed by conven-

tional dissection method. The stubborn bleeders were ligated with silk suture.

Regarding tonsillectomy time, it is calculated as the time interval between the first incision to the time when all bleeding and oozing is secured completely. While the operative blood loss calculated by weighing the blood impregnated gauze packs against equal number of unused packs as well by measuring the volume of blood for each side separately subtracting the volume of aluminium potassium sulfate used. Volume of blood of the packs was calculated by dividing weight of blood on the pack by the specific gravity of blood, i.e. 1.055.¹⁴ The results of the study were statistically analyzed by using paired t test for significance.

RESULTS

The age range of the studied patients was 2-32 years; 17 were males and 13 were females. The average time for tonsillectomy in non-aluminium potassium sulfate sides was 13.6 minute. With the use of aluminium potassium sulfate, the average time reduced to 9.7 minute, which means reduction in tonsillectomy time by 28.6% which is statistically significant ($p < 0.001$).

The average operative blood loss in non-aluminium potassium sulfate side was 45.5 ml while that in aluminium potassium sulfate side was 36.5

Table: Comparison of variables with and without using Alum.

Groups	Means	Decrease in %
Time of tonsillectomy in minutes		
Non-Aluminium potassium sulfate	13.6	28.6
Aluminium potassium sulfate	9.7	
Blood loss (ml)		
Non-Aluminium potassium sulfate	45.5	19.7
Aluminium potassium sulfate	36.5	
Number of ties used		
Non-Aluminium potassium sulfate	1.5	33.3
Aluminium potassium sulfate	1.0	

ml, which means 19.7% reduction in operative blood loss. These results are statistically significant ($p < 0.001$).

The maximum numbers of lines ties use were four. In the aluminium potassium sulfate side, the average number of ties was 1.5 while that in aluminium potassium sulfate (>99% pure) side was 1.0, this mean that we have 33.3% reduction in the number of ligatures used in tonsillectomy after use of Aluminium potassium sulfate as haemostatic agent, which is also statistically significant ($p < 0.001$).

DISCUSSION

The first known tonsillectomy was performed by Cornelius Celsus about 2000 years ago, after enucleating the tonsil with his fingernail, he suggested the fossae should be washed with vinegar and painted with a medication to reduce bleeding,¹ since that time techniques for faster tonsillectomy with less bleeding have been searched

Various haemostatic agents and technique have been tried. Sharp and Rogers,¹⁵ used calcium alginate swabs to achieve haemostasis after tonsillectomy but reduction in both tonsillectomy time and blood loss was not significant. In past many studies where done utilizing electro cauterization for haemostasis, Papangelou,¹⁶ demonstrated 30% reduction.

Waston and Murty¹⁷ in their study of 1036 cases, achieved good haemostasis and a tonsillectomy time of 9.2 ± 40 min, but the use of electrocauterization results in more of postoperative pain and excess of slough formation in the tonsillar bed which results in infection and secondary haemorrhage.¹⁸

Laser tonsillectomy under general anaesthesia shown to reduce surgical blood loss, reduce postoperative pain and increase the recovery rate.^{19,20}

The use of Aluminium potassium sulfate (>99% pure) as a haemostatic agent in tonsillectomy was not written in reviewing the available literatures. The mechanism by which alum halts bleeding is not clearly understood. Protein precipitation and/or vasoconstriction are proposed mechanisms. Precipitation occurs primarily on the cell surface and superficial interstitial spaces. This leads to decreased capillary permeability, contraction of intercellular space, vasoconstriction, hardening of the capillary endothelium and a reduction in oedema, inflammation and exudates.^{21,22}

Alum stops superficial bleeding and is used to stop intractable haematuria caused by a multiple array of causes. The mechanism of this ac-

tion has not yet been properly investigated. The present study confirms that the use of aluminium potassium sulfate in tonsillectomy was able to achieve reduction in tonsillectomy time and operative blood loss by 31% and 32.9%, respectively. All these results are statistically significant.

No adverse effect was reported by the use of aluminium potassium sulfate in tonsillectomy in the present study, safety of alum irrigation has been established in many studies,²³ its toxicity after intravenous injection has to be addressed thoroughly. For instance, patients with a damaged urinary bladder wall or renal impairment are at increased risk of developing aluminium toxicity. Intact renal function is essential for rapid disposal of a parenteral aluminium dose.²⁴ Therefore, patients with renal impairment are at increased risk of developing encephalopathy, which might be a major drawback against routine use of alum.^{2,25}

The interesting additional benefit of aluminium potassium sulfate is its action to clarify and exact localization of bleeders which need to be ligated, especially in cases of difficult dissection in fibrotic tonsil in which excessive bleeding occurs.

CONCLUSION

Local application of aluminium potassium sulfate on tonsillar bed in tonsillectomy is beneficial in regard to decreased volume of blood loss, procedure time, and number of ties used.

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