

The Benefit of Alum in Tonsillectomy

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ABSTRACT

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.

Objectives: This study was carried out to evaluate the effect of aluminium potassium sulfate (> 99% pure) on tonsillectomy time, blood loss during the surgery as well as on the number of ties used.

Patients and Methods: A prospective randomized trial of 45 patients was carried out, in which tonsillectomy performed using aluminium potassium sulfate (> 99% pure) as haemostatic agent in one side and in the other side no agent was used with gauze pack.

Results: Application of aluminium potassium sulfate (> 99% pure) in the tonsillar fossae reduces the operation time by 28.6%, the operative blood loss by 19.7% and also reduces the number of ties used by 33.3% in regard to control side. All these results are statistically significant.

Conclusions: local application of aluminium potassium sulfate (> 99% pure) on tonsillar bed after tonsillectomy is beneficial in regard to decrease the volume of blood loss, procedure time, as well as number of ties used.

Keywords: Aluminium potassium sulfate; haemostasis; tonsillectomy

INTRODUCTION

As far as we know, Celsus was the first to recognize tonsillar disease and its relationship to infection, and he performed the first tonsillectomy in 40 A.D¹. The popularity of tonsillectomy peaked in the 1930s, but after the use of antibiotics became widespread, enthusiasm for the procedure waned and its use had 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 therapy². Chronic tonsillitis is one of the most common and frequent illnesses within otolaryngology. Tonsillectomy is also one of the most frequently performed surgical procedures. The patients' quality of life and general health becomes demonstrably reduced by chronic palate and pharyngeal infections³. Hitherto existing tonsillectomy outcome studies were mostly done on children^{4,5}.

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 cystitis⁸. Alum can also control haemorrhage from advanced rectal carcinoma⁹ or oesophageal

varices¹⁰. Alum proved to be safe and effective and thus remains the drug of choice for persistent vesical haematuria¹¹. In addition, mouth rinses containing alum have been shown to reduce dental plaques and can therefore be useful in preventive dentistry^{12,13}.

AIMS

The aims of this prospective study is 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 conventional 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. 1.05514. 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 (>99% pure) sides was 13.6 minute. With the use of aluminium potassium sulfate (>99% pure), the average time reduced to 9.7 minute, which means reduction in tonsillectomy time by 28.6% which is statistically significant ($P < 0.0001$).

The average operative blood loss in non-aluminium potassium sulfate (> 99% pure) side was 45.5 ml while that in aluminium potassium sulfate (>99% pure) side was 36.5ml, which means 19.7% reduction in operative blood loss. These results are statistically significant ($P < 0.0001$).

The maximum numbers of lines ties use were four. In the aluminium potassium sulfate (>99% pure) 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 (>99% pure) as haemostatic agent, which is also statistically significant ($P < 0.0001$).

DISCUSSIONS

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 bleeding¹, since that time techniques for faster tonsillectomy with less bleeding have been searched.

Various haemostatic agents and technique have been tried. Sharp and Rogers¹⁵, 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, Papangelou¹⁶ 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 electro-cauterization results in more of postoperative pain and excess of slough formation in the tonsillar bed which results in infection and secondary haemorrhage¹⁸.

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 exudate^{21,22}.

Alum stops superficial bleeding and is used to stop intractable haematuria caused by a multiple array of causes. The mechanism of this action has not yet been properly investigated. The present study confirms that the use, 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 studies²³, 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 dose²⁴. 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, specially in cases of difficult dissection in fibrotic tonsil in which excessive bleeding.

CONCLUSION

Tonsillectomy occupies significant share in any operation list on a single day at any hospital and any reduction in tonsillectomy time will greatly effect the number of surgeries performed within a stipulated time and it has been found that majority of tonsillectomy time is used for achieving haemostasis, i.e. putting ligatures, as use of aluminium potassium sulfate reduced the number ligatures used so a major reduction in tonsillectomy time can be achieved. Faster tonsillectomy means increased number of

surgeries performed on a single day, which could be bonus to the already cramped budget of the hospital in our country.

Groups	Means	Decrease %
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	
No. of tie used		
Non- Aluminium potassium sulfate	1.5	33.3
Aluminium potassium sulfate	1.0	

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