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. This study was carried out to evaluate the effect of bismuth subgallate (BSG) and adrenaline on tonsillectomy time blood loss during the surgery as well as on the number of ties used. A prospective randomized trial of 60 patients was carried out, in which 30 had a tonsillectomy performed using BSG as haemostatic agent and in the remaining no haemostatic agent was used. Application of BSG in the tonsillar fossae reduces the operation time by 31.49%, the operative blood loss by 33.28% and also reduces the number of ties used by 53.33%. All these results are statistically significant.

Key Words: Bismuth subgallate; haemostasis; tonsillectomy

Bismuth compounds are fairly known to Otolaryngologist, most common among them is Bismuth subnitrite which is used in production of bismuth subnitrate and iodoform paraffin paste was a common antiseptic used for nasal packing in cases of epistaxis.

Bismuth subgallate (BSG) is bismuth salt of gallic acid relatively insoluble and poorly absorbed by the body It is powerful astringent.

The chemical structure of BSG bears some relationship to ellagic acid; both are derivatives of gallic acid. Ellagic acid is a clot-promoting agent that initiates thrombin formation via the intrinsic pathway through an action on Hageman factor (factor XII). Its capacity to activate Hageman factor has been thought to reside in its negatively charged groups.

The similarity of the structure of BSG to that of ellagic acid suggested that the hemostatic properties of BSG might be mediated through activation of Hageman factor.

Thorisdottir et al[1] first described the use of BSG in tonsillectomy. Bismuth subgallate and adrenaline paste was applied to the tonsillar fossa after tonsillectomy.

The aims of this prospective study is to evaluate the effects of BSG adrenaline past on Tonsillectomy time, operative blood loss and number of ties used to achieve haemostasis.

MATERIALS AND METHODS
Sixty patients undergoing tonsillectomy were randomly selected, of these sixty patients 30 underwent tonsillectomy with BSG/adrenaline past applied to each tonsillar fossa after the tonsil had been removed, remaining 30 patients underwent tonsillectomy without any haemostatic agent. Bismuth subgallate and adrenaline paste was made by mixing 26 gms of BSG powder to 20 ml of normal saline with 0.7 ml of 1:1000 adrenaline. Tonsillectomy was performed by dissection and snare method. The stubborn bleeders were ligated with lines ties.

Following parameters were recorded in each case
1. Tonsillectomy time – the time interval between the first incision to the time the Boyle-Davis gag was removed.
2. Operative blood loss – was calculated by weighing the stained swabs against equal number of unused swabs as well by measuring the volume of blood in the suction bottle at the end of tonsillectomy. Volume of blood of the swabs in calculate by dividing weight of blood on the swabs by the specific gravity of blood, i.e. 1.055.[2]

The results of the study were statistically analyzed by using paired t-test for significance.

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RESULTS
Thirty patients each belonged to either of the groups. The age range in the BSG cohort was 6–32 years, and that in non-BSG group 6–22 years.

The average time for tonsillectomy in non-BSG group was 25.4 (±5.2) minute. With the use of BSG the average time reduced to 17.4 (±4.86) minute, which means reduction in tonsillectomy time by 31.49% and statistically significant \((P < 0.0001)\).

The average operative blood loss in non-BSG group was 91.3 ml (±17.05) while that in BSG group was 60.93 ml (±20.23), which means 33.28% reduction in operative blood loss. These results are statistically significant \((P < 0.0001)\) [Table 1].

The maximum numbers of lines ties use were four. In the non-BSG group the average number of ties was 1.5 while that in BSG group was 0.753, 33% reduction is the number of ligatures used in tonsillectomy after use of BSG as haemostatic agent, which is also statistically significant \((P = 0.0004)\).

DISCUSSION
The first known tonsillectomy was performed by Cornelius Celsius about 200 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 [3] since that time techniques for faster tonsillectomy with less bleeding have been searched.

Table 1: Descriptive statistics

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>(P) value</th>
<th>Decrease percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonsillectomy time (min)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-BSG</td>
<td>25.4</td>
<td>5.2</td>
<td>&lt;0.0001</td>
<td>31.49</td>
</tr>
<tr>
<td>BSG</td>
<td>17.4</td>
<td>4.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood loss (ml)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-BSG</td>
<td>91.3</td>
<td>17.05</td>
<td>&lt;0.0001</td>
<td>33.28</td>
</tr>
<tr>
<td>BSG</td>
<td>60.93</td>
<td>20.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. Linen ties used</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-BSG</td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSG</td>
<td>0.753</td>
<td>0.0004</td>
<td>33</td>
<td></td>
</tr>
</tbody>
</table>

The various haemostatic agents and technique have been tried. Sharp and Rogers [4] 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 electrocauterization for haemostasis, Papangelou [5] demonstrated 30% reduction.

Waston and Murty [6] in his study of 1036 cases, achieved good haemostasis and a tonsillectomy time of 9.2 ± 40min.

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 haemorrhage.

The use for BSG as a haemostatic agent in tonsillectomy had started as early as 1978, Maniglia [7] studied effect of BSG in tonsillectomy on 1428 and found only 0.28% of total haemorrhage.

Wormald and Sellars [8] use BSG during adenotonsillectomy on 90 patents and demonstrated reduction in operation time from 11.5 to 9.9 min 13.91% reduction while number of ties were reduced from 3.4 to 2.1, 38.25% reduction, all these results were statistically significant.

O'Dwyer and Fentoss [9] carried out a study in 100 pediatric patients undergoing tonsillectomy with use of BSG, they achieved a 51.25% reduction in tonsillectomy time and the reduction in number of ties was 55.88%.

Callanan et al [10-12] in their study on tonsillectomy with BSG use showed reductions of 32% of in operation time by Junior staff and reduction of 21% in operative blood loss.

The present study with use BSG of in tonsillectomy was able of achieve reduction in tonsillectomy time and operative blood loss which was 33.28 and 53.33%, respectively. All these results are statistically significant.

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 BSG reduced the number ligatures used so a major reduction in tonsillectomy time can be achieved.