Does Surgical Technique Influence Post-Tonsillectomy Haemorrhage? Our Experience

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Abstract

Introduction and objectives: Tonsillectomy represents one of the main surgical procedures for the otolaryngologist, with haemorrhage being the most common postoperative. The objective of this study was to determine the post-tonsillectomy haemorrhage rate, and relate the surgical technique, diagnosis and patient age.

Methods: This was a retrospective study, from April 2012 to January 2014, covering 429 patients. We used the following surgical-dissection techniques: cold, Colorado needle and monopolar forceps. Haemostasis was carried out in every case with monopolar forceps and gauze compression.

Results: Post-tonsillectomy haemorrhage rate was 6.99%. According to the surgical technique used, with Colorado needle dissection, the bleeding rate we found was 7.07%; with monopolar forceps dissection, the rate was 20.4%; and with cold dissection, 2.9%. Of all haemorrhages, only 9 (2.09%) needed reintervention, of which 40% were performed with monopolar forceps dissection. The group with the largest bleeding rate was that of more than 14 years old. The diagnosis most associated with bleeding was peritonsillar abscess.

Conclusion: The lowest bleeding rate was found with cold dissection and monopolar forceps haemostasis (2.09%). Consequently, based on our experience and the results obtained in the study, we consider that surgical technique does influence post-tonsillectomy haemorrhage.

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¿Influye la técnica quirúrgica en las hemorragias postamigdalectomía? Nuestra experiencia

Resumen

Introducción y objetivos: La amigdalectomía representa uno de los principales procedimientos quirúrgicos del otorrinolaringólogo, siendo la hemorragia la complicación posquirúrgica más frecuente. El objetivo de este estudio es determinar la tasa de hemorragia postamigdalectomía y relacionarla con la técnica quirúrgica, el diagnóstico y la edad del paciente.

Métodos: Se realiza un estudio retrospectivo con un periodo comprendido desde abril de 2012 a enero de 2014 con un total de 429 casos. Se emplearon las siguientes técnicas quirúrgicas de disección: fría, punta de colorado y pinza monopolar. La hemostasia se realizó en todos los casos con pinza monopolar y compresión con gasa.

Resultados: La tasa de hemorragia postamigdalectomía fue del 6,99%. Según la técnica empleada, con la disección con punta de colorado obtuvimos una tasa de sangrado del 7,07%, con disección con pinza monopolar del 20,4% y con disección fría del 2,9%. De todas las hemorragias, únicamente 9 (2,09%) necesitaron revisión quirúrgica, de las cuales el 40% habían sido realizadas con la técnica de pinza monopolar. El grupo con mayor tasa de sangrado fue el de más de 14 años; y el diagnóstico que más se relacionó con hemorragias fue el de absceso periamigdalino.

Conclusiones: La técnica con menor tasa de sangrado es la disección fría con hemostasia con pinza monopolar (2,9%). Por lo tanto, según nuestra experiencia y los datos obtenidos con este estudio, consideramos que la técnica quirúrgica sí influye en la aparición de hemorragias.

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Introduction

Tonsillectomy is one of the oldest and most common procedures performed by ENT specialists. The indications for it, although they have changed through the years, cover both children and adults. These indications include chronic or recurring tonsillitis and to treat sleep apnoea/hypopnoea syndrome (SAHS).1-4

Throughout history surgical techniques for tonsillectomy have varied. Changes have been made in line with the reduction in intra- and post-operative complications, lower short-term morbidity and shorter operating times, amongst others. However, to date, no technique appears to be clearly superior.5

Despite being generally considered low-risk surgery, tonsillectomy has the potential for extensive complications, of which postoperative haemorrhage is the most common.2,4-7

For this reason, the main objective of this study was to determine, according to our experience, the prevalence of this postoperative complication and to evaluate whether the technique used has an influence on its onset.

According to literature, the frequency of onset varies considerably depending on the author, ranging from 1.5% to 20%.1,2,5,7-11 According to Sheshamani,2 the post-tonsillectomy bleed rate in a study which only included adults was 6%. Walker et al., in a prospective study which analysed 1133 tonsillectomies,9 observed that 4.5% of the patients presented with this complication. Monopolar forceps dissection presented a lower postoperative haemorrhage rate compared with cold dissection followed by coagulation, but presented a greater risk of surgical re-intervention and blood transfusion.

Various surgical dissection techniques are used currently, from the traditional cold dissection, to different “hot” techniques, such as Colorado needle, coblator, electrocautery (monopolar and bipolar forceps), microdebrider, amongst others. Different techniques are also used to achieve haemostasis of the tonsil bed; these include gauze compression, coagulation with monopolar or bipolar forceps, suturing of pillars, coblator, etc.

In a study which compared the onset of haemorrhage after dissection by coblation and by electrocautery in 90 patients, only one episode of bleeding was encountered which occurred in a patient operated using electrocautery.10

In the study performed by Gallaher et al. which compared the onset of postoperative bleeding in 4776 patients, after dissection techniques using electrocautery, coblator and microdebrider, a haemorrhage rate of 1.7% was observed; the most frequent being after electrocautery (1.9%).11

Comparing dissection by electrocautery and cold dissection, it can be concluded from the study performed by Lee et al.12 that, out of 337 patients, the postoperative bleed rate in adults operated using electrocautery was 12%, compared with those operated using cold dissection (5.5%). For children the haemorrhage rate in both groups was not statistically significant.

In the National Prospective Tonsillectomy Audit (NPT)11 which compared 33,921 tonsillectomies performed using different surgical techniques, it can be seen that the lowest bleed rate was obtained with cold dissection with suturing of the pillars (.17%), followed by cold dissection...
and haemostasis with bipolar forceps (2.7%) and with monopolar forceps (2.9%). Bipolar forceps present a greater risk of bleeding at 4.6%, a similar percentage to that of the coblator. According to this study, the technique with the poorest results in terms of postoperative haemorrhage rate is dissection with monopolar forceps (6.6%). In a meta-analysis which included 3384 patients, it was observed that the prevalence of post-tonsillectomy haemorrhage was around 3.3%. Evans and Khan performed a study which used telephone interviews with post-tonsillectomy patients and found that 40% of the patients had experienced some type of bleeding, however only 8% required admission to hospital and 3% required surgical reintervention.

According to Blakley, the maximum acceptable post-tonsillectomy haemorrhage rate is 13.9%. However, rates have been reported in literature that vary in a range from 18% and 20%. This author considers that rates up to 5% are reasonable and those exceeding 14% should be monitored and their causes examined.

Other secondary objectives in our study were to observe the relationship between post-tonsillectomy haemorrhage and the patient’s age, the need for reintervention, the time elapsing between surgery and the onset of the complication and also the association with the preoperative diagnosis, and therefore, with the surgical indication.

Methods

This is a retrospective cross-sectional study, with a study period of 21 months (April 2012 to January 2014, inclusive).

The statistical study was performed with Chi-squared and Fisher’s tests according to the sample size for the qualitative variables and Student’s t-test for paired data and the Kruskal Wallis test for analysing the quantitative and qualitative variables, according to the sample size. 95% was taken as statistical significance.

429 tonsillectomy cases were included, accompanied or otherwise by adenoidectomy. The sample included both children and adults, of both sexes. These patients had no disorders and were not undergoing chronic treatments which would influence a greater incidence of bleeding. The minimum age was 3 and the maximum 59.

The preoperative diagnoses included chronic tonsillitis, defined as six or more episodes a year of purulent tonsillitis requiring antibiotherapy or three or more episodes in 6 months; SAHS; tonsillar hypertrophy or adenotonsillar hypertrophy, peri-tonsillar abscess, and tonsillar remnant.

The surgical techniques used in our hospital are cold dissection, Colorado needle dissection and dissection with monopolar forceps. Haemostasis is achieved combining gauze compression with cautery by monopolar forceps.

All the patients were treated with a dose of antibiotherapy (cefazolin or clindamycin, for those allergic to penicillin) 30 min before surgery and 4 h after surgery. They were also treated with a regime of dexametazone and paracetamol at appropriate doses for 7 days and intravenous rescue paracetamol in the first 24 h postoperatively.

In this study, post-tonsillectomy haemorrhage is defined as all episodes of bleeding after tonsillectomy (in adenotonsillectomy cases, only those where the bleeding was seen to come from the tonsil bed were considered) causing the patient to attend the Emergency department; in our department the protocol is to admit the patient or at least keep them under observation.

The reintervention criterion depends to a certain extent on the surgeon in charge of the case, but it can be defined as bleeding which is not stopped using local compression or which causes haemodynamic instability in the patient.

Results

428 cases underwent tonsillectomy, accompanied or otherwise by adenoidectomy. Cold dissection was the technique used on 168 patients, Colorado needle dissection was used for 212 and the rest, i.e., 49 cases, dissection with monopolar forceps. Therefore, Colorado needle was used in almost half the patients.

Of the total number of tonsillectomies, 30 patients presented with postoperative haemorrhage, which represents a post-tonsillectomy haemorrhage rate of 6.99%.

Of these 30 patients presenting with haemorrhage, 5 had been operated with cold dissection, 15 with Colorado needle dissection and 10 with monopolar forceps (P: .00047), (Table 1). Although it is true that the highest number of bleeds occurred with the Colorado needle, it should be remembered that this was the most-used technique (49.41%). By contrast, dissection with monopolar forceps, despite being in second place in absolute numbers, was the least-used technique (11.42%). For its part, cold dissection was the technique with the fewest bleeds and was also the second most frequently used technique (39.16%).

Therefore, in relative terms, i.e., bearing in mind the number of bleeds compared to the number of patients operated using each technique, the technique with the highest bleed rate was monopolar forceps dissection (Table 1).

It is important to highlight that of the 30 patients presenting with post-tonsillectomy haemorrhage, only 9 (30%) required reintervention to control it, this represents a reintervention rate of 2.09% of the total number of patients in our sample.

Breaking down the analysis by surgical technique used, it can be appreciated that of the 5 patients presenting with post-tonsillectomy haemorrhage with cold dissection, 2 required reintervention, this represents 40% of the total number of bleeds using this technique. Of the 15 who bled after Colorado needle dissection, 3 patients were reoperated, i.e., 20%. Finally, of the 10 patients who bled after intervention with monopolar forceps dissection, 4 required reintervention in the operating theatre, which represents 40% (P: .001). It is important to highlight that, while it is true that in relative terms the percentage of reintervention is the

<table>
<thead>
<tr>
<th>Technique</th>
<th>Total operations</th>
<th>Haemorrhage</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold dissection</td>
<td>168</td>
<td>5</td>
<td>2.9%</td>
</tr>
<tr>
<td>Colorado needle</td>
<td>212</td>
<td>15</td>
<td>7.07%</td>
</tr>
<tr>
<td>Monopolar forceps</td>
<td>49</td>
<td>10</td>
<td>20.4%</td>
</tr>
</tbody>
</table>
same for cold dissection as for monopolar forceps dissection, in absolute terms we encountered a clear predominance of bleeding after monopolar forceps dissection.

To quantify blood loss in patients who bled in the postoperative period, in this study haemoglobin (Hb) and haematocrit (Ht) were tested in the preoperative period and 24 h after the episode of bleeding.

A mean preoperative Hb of 13.97 g/dl was observed, and a mean postoperative Hb of 11.97 g/dl, the mean preoperative Ht was 41.16% and the mean postoperative Ht was 35.09%.

A reduction of 2 g/dl of haemoglobin was observed on comparing the pre- and postoperative results (confidence interval 0.9–3.09), these data were statistically significant (P.0011). A 6% haematocrit reduction was observed between the pre- and postoperative periods (confidence interval 2.77–9.37); these results are also statistically significant (P.0012).

On analysing the reduction in Hb and Ht according to each surgical technique, no statistically significant difference was observed between the 3 techniques (P.2).

Of the total number of patients operated, only one required a blood transfusion; that patient had been operated with Colorado needle dissection (Table 2).

In terms of age group, we had a broad study sample, with ages ranging between 3 and 59. We decided to divide the sample into 2 groups for this study: patients under 14 years of age, who were considered to be of paediatric age, and those aged 14 and over, who were considered adults (P.000006).

In the timeframe of this study, more children were operated than adults: 290 patients under 14 years of age and 139 of 14 and over. However, the number of post-tonsillectomy haemorrhages in the second group was twice as high. Thus we had 10 patients under 14 presenting with postoperative haemorrhage and 20 patients of 14 and over presenting with this complication. It is worth noting that all the reinterventions were performed on patients over 14 years of age.

The preoperative diagnoses were: adenotonsillar hypertrophy, tonsillar hypertrophy, SAHS, chronic tonsillitis, tonsillar remnant and peri-tonsillar abscess.

Taking these diagnoses into account, if the absolute numbers are considered, we find that the most frequent diagnosis was chronic tonsillitis (148 patients), followed by SAHS (109 patients) (Table 3).

Nonetheless, it is important to highlight that the patients, most of them of paediatric age, who had been given diagnoses of adenotonsillar hypertrophy or tonsillar hypertrophy, could actually be patients with childhood SAHS or, in any case, their obstructive symptoms might have decided the surgical indication. Therefore, the number of patients with a diagnosis of SAHS could be higher. However, the design characteristics of this study, as it is retrospective, become a limitation to the exact interpretation of these data.

With regard to patients with post-tonsillectomy haemorrhage and preoperative diagnosis, we found that a third of patients diagnosed with peri-tonsillar abscess presented with a haemorrhagic episode. Patients diagnosed with chronic tonsillitis were in second place (13.8%), (P=.0022).

With regard to the time of onset of haemorrhage, we divided the episodes into immediate, in other words, those occurring in the first 24 h; those occurring between postoperative day 1 and 7 and those occurring between day 7 and 14 of the postoperative period. We did not encounter any episodes of bleeding after the fourteenth day.

Of the 30 patients presenting with bleeding, 4% had an immediate episode and the remainder after the first 24 h following surgery. 38% presented with post-tonsillectomy haemorrhage between day 1 to 7 and 58% between day 7 to 14 (Fig. 1).

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>No haemorrhage</th>
<th>Haemorrhage</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATH</td>
<td>123</td>
<td>4</td>
<td>3.25%</td>
</tr>
<tr>
<td>TH</td>
<td>31</td>
<td>4</td>
<td>12.9%</td>
</tr>
<tr>
<td>SAHS</td>
<td>107</td>
<td>2</td>
<td>1.86%</td>
</tr>
<tr>
<td>Chronic</td>
<td>130</td>
<td>18</td>
<td>13.8%</td>
</tr>
<tr>
<td>tonsillitis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tonsillar remnant</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Abscess</td>
<td>6</td>
<td>2</td>
<td>33.3%</td>
</tr>
</tbody>
</table>

TH, tonsillar hypertrophy; ATH, adenotonsillar hypertrophy; SAHS, sleep apnoea/hypopnoea syndrome.

| Table 2 Need for Reintervention and Transfusion According to Surgical Technique. |
|----------------------------------------|-------------------|-----------------|
| Technique                      | Total operations | Need for reintervention | Need for transfusion |
| Cold dissection                       | 168               | 2                | 0                |
| Colorado needle                        | 212               | 3                | 1                |
| Monopolar forceps                     | 49                | 4                | 0                |

<p>| Table 3 Number and Percentage of Patients Who Underwent Tonsillectomy With Post-Tonsillectomy Haemorrhage According to the Preoperative Diagnosis. |
|----------------------------------------|-------------------|-----------------|</p>
<table>
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<table>
<thead>
<tr>
<th>Figure 1 Percentage of patients with post-tonsillectomy haemorrhage according to the time of onset.</th>
<th>4%</th>
<th>38%</th>
<th>58%</th>
<th>0%</th>
<th>1-7 days</th>
<th>8-14 days</th>
<th>Immediate</th>
</tr>
</thead>
</table>

Discussion

Although tonsillectomy is a common operation in the ENT specialist’s usual practice, much effort has been made to study, analyse and even to develop the different surgical techniques available to us today. The most relevant aspect of the operation and the one which is of most concern to surgeons is probably the post-tonsillectomy haemorrhage rate.

We obtained a post-tonsillectomy haemorrhage rate in this study of 6.99%. In most of the literature we consulted this rate is between 1% and 5%.11,12 According to the aforementioned study by Blakley, we are within a range in our hospital which, although not optimal, is acceptable (between 5% and 13.9%).10

The data provided by the National Prospective Tonsillectomy Audit, show that the rate of haemorrhage varies considerably according to the surgical technique used.11

In our centre, the technique with the highest bleed rate is cold dissection with monopolar forceps haemostasis (2.9% of post-tonsillectomy haemorrhages). This result coincides with that of the NPT for the same technique, both for dissection and haemostasis.11

By contrast, the technique with the highest bleed rate was dissection and haemostasis by monopolar forceps (20.4%); these results coincide with other studies.5,6,11 This result is higher than those obtained in other studies such as that of the NPT (4.6%).11 This result is all the more striking if we consider that this technique was the least frequently used in this study.

Moreover, with Colorado needle dissection and haemostasis by monopolar forceps, a haemorrhage rate of 7.07% was achieved. These differences in the percentage of post-tonsillectomy haemorrhage onset are statistically significant. We observe that as thermal damage increases in the postoperative bed caused by the dissection-coagulation binomial, so does the bleed percentage.

Unlike that described by Walker,8 postoperative haemorrhages occurring after monopolar forceps dissection are more common, and as we shall see later, more serious, than after cold dissection or even Colorado needle.

Comparing our results with other available techniques, such as electrocautery, coblator and microdebrider, we observe that most authors agree that the onset of post-tonsillectomy bleeding is more frequent after these techniques compared to cold dissection. Likewise, in most of the studies we reviewed, dissection with monopolar forceps presents greater bleed rates, except for the NPT where the coblator has the highest post-tonsillectomy haemorrhage rate, clearly exceeding those of monopolar forceps.11-13

Although in this study electrocautery (monopolar forceps) was used for haemostasis in all patients, it is important to consider the relevance of this method in the onset of post-tonsillectomy haemorrhage. In a study published by Windfuhr et al., it was found that there are significant differences in the time of the onset of bleeding (before and after the first 24 h). According to this group, patients who underwent haemostasis by electrocautery presented a greater number of early bleeds, compared to the traditional technique of suturing the pillars. By contrast, the patients whose pillars were sutured presented with a greater number of haemorrhages in the late postoperative period.15

In our study, of the total number of post-tonsillectomy haemorrhages, 9 required reintervention (2.09%). In order to study this data properly, it is important to highlight the crucial importance of the definition of "post-tonsillectomy haemorrhage".5,6 Studies where it is defined as "patients who present with bleeding which is sufficient to require reintervention", will obviously present lower bleeding rates. For others, as in our case, because we define post-tonsillectomy haemorrhage as "patients who require medical attention (surgical or medical)", the rates will be higher. Furthermore, it has been demonstrated that mild, self-limiting episodes of bleeding increase the risk of presenting more serious episodes of bleeding.3,8,10

The technique which required the highest number of reinterventions was monopolar forceps dissection (4 patients out of 10 who presented with postoperative haemorrhage): these results coincide with those of other studies. Compared with the NPT,11 in our case the percentage of patients who required reintervention after this technique was greater (8.2% in our hospital compared with 1.6% in the NPT).

However, it is important to highlight that, although Colorado needle dissection presented a not inconsiderable bleed rate (7.07%), in percentage terms a lower reinvention rate was required when compared with the other two techniques.

Thus, although with Colorado needle dissection 3 patients and 2 patients with cold dissection required reintervention in the operating theatre, these represent 20% and 40%, respectively. Therefore, although the haemorrhage rate with Colorado needle dissection is greater, it is in its favour that the bleeds tend more often to be self-limiting compared to the other techniques studied.

As mentioned in all the studies performed, the age group with the highest rate of bleeding was the adult group (>14), (14.5%),15 This might be due to the greater likelihood of fibrosis because these tonsils have probably presented a greater number of infections.16

This relates to the diagnosis most associated with the onset of post-tonsillectomy haemorrhages, which in our case was a history of previous peri-tonsillar abscess (33.3%), followed by chronic tonsillitis (13.8%).

Therefore, where there is more fibrosis from more inflammatory-infectious episodes, the result is a greater need for cautery, causing further injury to the bed and the formation of larger eschars, with the increased likelihood that one might fall off and cause bleeding. This is why most episodes are recorded between the fifth to the tenth postoperative days.

Conclusions

We conclude in our study that the surgical technique with the lowest postoperative haemorrhage rates is cold dissection with haemostasis by monopolar forceps. On the other hand, monopolar forceps dissection is the technique with the highest rates of bleeding; these results are statistically significant.

Adult patients and patients with a preoperative diagnosis of peri-tonsillar abscess and chronic tonsillitis are at
greatest risk of presenting with an episode of haemorrhage, according to our results. We observed that in most cases these episodes occurred in the late postoperative period.

Therefore we can conclude that, according to our study, surgical technique does indeed influence the onset of post-tonsillectomy haemorrhage in a statistically significant way.

References


