

Comparison of three techniques for tonsillectomy during free medical camps in Yemen

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Objective

The aim of the study was to compare four different surgical techniques for tonsillectomy during free medical camps in Yemen, regarding type of anesthesia, complication rates, operative time, and cost of the operation.

Patients and methods

This prospective study was conducted from April 2006 to December 2011. There were 12 280 patients who underwent tonsillectomy in 26 hospitals in different Yemeni governorates, and operations were performed in 46 free medical camps. Under general anesthesia, we performed traditional dissection techniques (TDTs) and bipolar diathermy technique. Under local anesthesia, tonsillectomies were performed using TDT and guillotine excision technique.

Results

Of the 12 280 tonsillectomies patients, 53.7% were male patients and 46.3% were female patients. The median age of the patients was 11.5 years (range 3–30 years). Under general anesthesia, 6639 (54.1%) tonsillectomies were performed; of these, 86.1% were performed by TDT, whereas 13.9% were performed by bipolar diathermy technique. Under local anesthesia, 5641 (45.9%) tonsillectomies were performed; of these, 81% were performed by TDT, whereas 19% were performed by guillotine excision technique. Post-tonsillectomy hemorrhage was low in patients operated by TDT as compared with the other techniques. No significant differences were found in operative time between the four surgical techniques. The costs of tonsillectomy ranged between 30 and 37\$.

Conclusion

The TDT is the most common method performed in the free medical camps, is handy, favorite, less costly, and comfortable for our patients, and is suitable for our work environments, experiences, and equipments. We recommend this technique for the same circumstances as a day-case tonsillectomy. Although less postoperative hemorrhage was observed in traditional surgery under general anesthesia, surgery under local anesthesia is safer and less costly.

Keywords:

complications, free medical camps, technique, tonsillectomy, Yemen

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Introduction

Tonsillectomy is one of the most common surgical procedures performed worldwide. Recent advancements in equipment technology have ushered in several new tonsillectomy techniques [1]. There is still controversy over which is the optimal technique of tonsillectomy with the lowest morbidity rates. Different techniques have evolved since then, including traditional dissection techniques (TDTs), guillotine excision, monopolar and bipolar diathermy dissection, cryosurgery, coblation technique, microscopic bipolar diathermy, ultrasonic removal, harmonic scalpel, and laser dissection [2–5]. All the techniques have certain advantage and disadvantage. Any improvement of this procedure should decrease operating time, postoperative hemorrhage, and particularly the postoperative morbidity [6]. Day-case tonsillectomy is safe, reduces the duration of hospital stay, and is less costly [7]. General anesthesia is invariably used in

performing tonsillectomy in children, whereas local or general anesthesia can be used in adult patients. Local anesthesia is generally regarded as a safer procedure than general anesthesia. However, it should be noted that local anesthesia is not without hazard [8,9]. The objective of this study was to compare the different surgical techniques for tonsillectomy during free medical camps in Yemen, regarding anesthesia type, complication rates including primary and secondary hemorrhage, operative time, and the cost of tonsillectomies carried out.

Patients and methods

This prospective study was conducted during the period from April 2006 to December 2011 in 26 general and rural hospitals in different Yemeni governorates, and operations were performed in 46 free medical camps,

which was considered one of the outreach government programs. Ministry of Public Health and Population aims to provide free medical services for Yemeni citizens, particularly in remote and sparsely populated areas, by technical team comprising various mobile and medical specialties. Data on tonsillectomy patients were collected prospectively and information sheets were filled up for the patients containing variables under study. Under general anesthesia, we performed tonsillectomies using TDTs and bipolar diathermy technique (BDT). Under local anesthesia, we performed tonsillectomies using TDT and guillotine excision technique (GET).

The indications for tonsillectomy or adenotonsillectomy were: patients having recurrent throat infection with a frequency of at least seven episodes in the past year or at least five episodes per year for 2 years or at least three episodes per year for 3 years, patients having bilateral enlarged tonsils causing respiratory obstruction and dysphagia, and patients having persistent cervical lymphadenopathy not responding to medical treatment with tonsillitis as the cause [10]. The preoperative preparations included analysis of complete blood count, bleeding and clotting time, HBsAg, hepatitis C virus, HIV, chest radiography when at hand, and fitness for operation by anesthesiologist. All patients or their guardian were requested to sign a form used in all public hospitals in Yemen. In traditional dissection tonsillectomy, we used standard specific tonsillectomy instruments including tonsil forceps, tonsil scissors, pillar dissector, Negus's artery forceps, and ligature silk.

Patients were subjected to tonsillectomy under local anesthesia when they were 14 years of age and above. Around 80% tonsillectomies using the TDT under local anesthesia were performed by four specialists, whereas 95% tonsillectomies using the GET were performed by four specialists, and 94% tonsillectomies using the BDT were performed by three specialists according to the medical school they were graduated from.

In local anesthesia, in sitting position all patients received four puffs of 7.5 mg/m² dose of lidocaine spray 5.5% immediately before local infiltration. Equal amount of local anesthesia (7–10 ml on either side) was infiltrated to the upper middle and lower pole of the tonsils and to the posterior arch with 1% lidocaine : adrenaline of 1 : 200 000.

The operating time was measured from the time of first incision to complete hemostasis of the tonsillar bed. Bleeding was classified as primary within 24 h or secondary after 24 h. Postoperative treatment in

the hospital included all patients given paracetamol ampoules immediately postoperatively in the ward or amoxicillin and paracetamol syrup, capsule, or injection according to the age, and they were advised to continue treatment for 1 week. In calculating the cost of the operation, we included financial incentives for operation team, anesthesia, and postoperative medicines, for wear and tear of medical equipment, and for consumption of electricity and water during free medical camps.

Inclusion criteria for patients were age between 3 and 30 years and both sexes undergoing tonsillectomy or adenotonsillectomy for indications mentioned above. Exclusion criteria included patients who were not subjected to the same circumstances in preparations, treatments and observations, and follow-up.

The primary and secondary hemorrhage was estimated in hospital or by the help of the patient or their relatives. The duration of stay of the operated patients in the hospital extended from 6 to 24 h under the observation, and then the patients were checked by specialist before discharging postoperatively. They were advised to return back if there is any bleeding. One specialist stayed in the hospital for at least 1 week after the end of each camp to check whether there are any complicated cases and to make a report including all his observations. After 6 months to 1 year, there was a follow-up and visit to hospital by camp members to check most of the patients who were operated upon and to contact them by telephone, and the visit was announced by the hospital, if there were any complications. Data were analyzed using SPSS software (version 15). All continuous variable values were reported as medians and range due to skewed data, and categorical variables were reported in proportions. Differences between proportions were tested by the χ^2 -test. *P*-value of less than 0.05 was considered significant. Ethical consideration was taken care of, although this study observed the surgical techniques routinely practiced by the surgeon himself according to his school. However, an ethical clearance certificate was obtained from the ethical committee of Faculty of Medicine and Health Science of Sana'a University.

Results

Of the 12 280 patients, 6594 (53.7%) were male patients and 5686 (46.3%) were female patients, and the median age of patients was 11.5 years (range 3–30 years). Under general anesthesia, 6639 (54.1%) tonsillectomies were performed; of these, 5719 (86.1%) were performed by TDT, whereas 920 (13.9%) were performed by BDT.

Under local anesthesia, 5641 (45.9%) tonsillectomies were performed; of these, 4566 (81%) were performed by TDT, whereas 1075 (19%) were performed by GET.

Of the 10 285 (83.8%) patients who underwent TDT, 6639 (54.1%) were operated under general anesthesia and 5641 (45.9%) patients under local anesthesia.

Among patients who were operated under general anesthesia, primary hemorrhage occurred in 81 (1.4%) patients subjected to TDT compared with 17 (1.8%) patients operated by BDT, whereas secondary hemorrhage occurred in 25 (0.4%) patients who underwent TDT compared with 14 (1.5%) patients subjected to BDT as shown in Table 1.

Under local anesthesia, primary hemorrhage occurred in 114 (2.5%) patients subjected to TDT compared with 42 (4%) patients who underwent GET. Secondary hemorrhage occurred in 28 (0.6%) patients who underwent TDT as compared with 11 (1%) patients who underwent GET. Unilateral incomplete removal of the tonsils was evident in four patients operated by GET, and six patients came with clinical picture of adenoid. Burn to the tongue and pillar and adjacent tissue was viewed in five patients operated by BDT (Table 2).

The median duration of operation in TDT under general anesthesia was 11 min, and in TDT under local anesthesia was 11 min and 20 s as shown in Table 3.

Of the 10 285 (100%) patients who were operated by TDT, 5719 (55.6%) were operated under general anesthesia, and 4566 (44.4%) were operated under local anesthesia. One patient expired because of general anesthesia complications.

The costs of tonsillectomy are as follows: TDT under local anesthesia 30\$, GET 30\$, TDT under general anesthesia 36\$, and BDT 37\$.

Discussion

Ideally, tonsillectomy should be quick and associated with no blood loss. In reality, however, the morbidity of tonsillectomy may be significant, and the surgeons should select the technique that, in their own hands, offers the minimum morbidity [11]. In our study, in addition to the above, we tried to choose the low cost technique in an attempt to minimize the cost of healthcare and to reduce the duration of hospital stay.

In our findings, primary and secondary hemorrhages were more frequent in the bipolar diathermy dissection (1.8 and 1.5%, respectively) compared with 1.4% primary and 0.4% secondary in the TDT. Our results are consistent with a previous study [12]. Regarding the postoperative hemorrhage, the primary hemorrhage was higher in bipolar diathermy dissection, and this may be due to the use of ties routinely during cutting the tonsils to control the bleeding in patients subjected to TDT. In addition, our ENT surgeons have a good experience in TDT, and as a result there was a high number of patients who underwent this technique (5719) as compared with only 920 patients who underwent the BDT. Secondary hemorrhage associated with bipolar dissection was high (1.5%) when compared with only 0.4% traditional dissection. This could be due to greater tissue damage within the tonsillar bed using the bipolar diathermy. Our findings agree with previous studies [13,14]. This may be expected to delay healing and predispose to the delayed secondary hemorrhage.

Primary hemorrhage occurred in 114 (2%) patients who underwent traditional dissection under local anesthesia, which is less than that occurred in patients who were operated by guillotine excision [42 (4%) patients]. This finding does not agree with other study [15]. The same results were obtained for secondary hemorrhage [28 (0.6%)]; we attributed these findings for both primary and secondary hemorrhage to the same idea of patients who underwent TDT under

Table 1 Distribution of patients according to surgical technique and postoperative hemorrhage (under general anesthesia)

Procedures	N	No hemorrhage [n (%)]	Primary hemorrhage [n (%)]	Secondary hemorrhage [n (%)]	Total hemorrhage [n (%)]
Traditional dissection	5719	5613 (98.14)	81 (1.42)	25 (0.44)	106 (1.85)
Bipolar dissection	920	889 (96.66)	17 (1.84)	14 (1.52)	31 (3.36)

χ^2 -Test = 17.1; $P < 0.0001$.

Table 2 Distribution of patients according to surgical technique and postoperative hemorrhage (under local anesthesia)

Procedures	N	No hemorrhage [n (%)]	Primary hemorrhage [n (%)]	Secondary hemorrhage [n (%)]	Total hemorrhage [n (%)]
Traditional dissection	4566	4424 (96.89)	114 (2.5)	28 (0.61)	142 (3.11)
Guillotine excision	1075	1022 (95.07)	42 (3.91)	11 (1.02)	53 (4.93)

χ^2 -Test = 8.7; $P = 0.013$.

Table 3 Distribution of surgical technique according to operative time

Techniques	N	Anesthesia	Min:s
Traditional dissection	60	General	11:00
Bipolar diathermy	60	General	11:00
Traditional dissection	60	Local	11:20
Guillotine excision	60	Local	11:30

general anesthesia. Unilateral incomplete removal of the tonsils was evident in four patients operated by guillotine excision. The reason behind this could be due to not using ties during cutting the tonsils.

Our results showed that six patients operated by guillotine technique still complained of nasal obstruction due to persistence of the adenoid. We could not remove adenoid under local anesthesia, and in our late follow-up we discovered that we did not solve the problem of airway obstruction due to persistence of adenoid. This is also one of the disadvantages of this technique. In the USA for example, tonsillectomy using guillotine eventually fell out of favor [16].

The median operating time for the different techniques was comparable between TDTs and BDTs. This result is controversial with another study [17]. Moreover, our operative time in both techniques was less than the previously cited study. This could be because of the surgeon used to operate in certain technique, and with long experience it not only takes less operative time, but also has less complications.

Of the 10 285 (83.8%) patients who underwent traditional tonsillectomy technique, 5719 (55.6%) were operated under general anesthesia and 4566 (44.4%) patients under local anesthesia. Post-tonsillectomy hemorrhage was observed in 3.1% patients operated under local anesthesia. This percentage is high compared with patients subjected to general anesthesia (1.85%). This percentage was similar to other studies [8,9]. We subjected all children under the age of 14 years to general anesthesia because of the great susceptibility of presence of adenoid. However, local anesthesia is safe, easy, and less costly. In contrast, the number of patients who underwent traditional tonsillectomy technique is high, because our ENT surgeons operating in free medical camps were graduated from different medical schools mainly previous Soviet Union, Germany, and Egypt, and the majority favored traditional tonsillectomy technique in their practice, and this method is still the most common technique not only in our country, but also in the UK [18].

The costs of tonsillectomy ranged between 30 and 37\$. There was no significant difference in the cost between the three techniques; however, in Yemen

electricity is weak, irregular, and electricity cutoff frequently, and this negatively affects the electrical equipments including bipolar diathermy cautery. In addition, this equipment for us is expensive; hence, tonsillectomy using BDT was less practical in free medical camps. Moreover, the cost of tonsillectomy was very low when compared with many other countries [1], as the surgeons and assistant medical staff working in free medical camps were mainly volunteers and all operations were performed in public hospitals. Finally, considering cost effectiveness, TDT is much economical than other techniques to provide comparable results in terms of better results, duration of surgery, and overall postoperative morbidity. In our comparison, we focused on serious complications such as death, hemorrhage, time, and cost but not on other less important and time-consuming postoperative outcomes such as pain, fever, and dehydration.

Conclusion

The TDT is the most common method, is more convenient, favorite, less costly, and comfortable for our patients and our environments, experiences, and equipments. We recommended this technique for the same circumstances as a day-case tonsillectomy. Although less postoperative hemorrhage was observed in traditional surgery under general anesthesia, surgery under local anesthesia is safer and less costly.

Acknowledgements

Conflicts of interest

None declared.

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