



LIGASURE (BIPOLAR VESSEL SEALING DEVICE) FOR TONSILLECTOMY IN RSU PKU MUHAMMADIYAH BANTUL, A CASE SERIES

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Abstract

Introduction: The most frequent treatment carried out by ORL-HNS is a tonsillectomy, which has a risk of a lengthy recovery period owing to bleeding. Numerous colleagues have utilized LigaSure to facilitate surgery. We want to talk about our experiences using this equipment during tonsillectomy surgery.

Material & Method: Due to the small sample size, a case series investigation was chosen. From January to June 2022, a study was undertaken at the RSU PKU Muhammadiyah Bantul hospital. Valleylab's LigaSure is registered as the LS10 LigaSure with short/long jaw probe. Electrocoagulation and cold dissection techniques were combined.

Result: Eight individuals with a range of tonsillectomy indications participated in this research. There was one postoperative hemorrhage found. Mean post-operative blood loss was 192,5 mL, with post-operative VAS scores of 3,5, 1, 3, 2, 5, and 1 on days 3, 5, and 7. A statistical value was inferred from one outlier observation.

Discussion: Due to its adaptability and quick recovery time, electrocoagulation-assisted tonsillectomy is most popular in the USA. However, multiple studies have found a correlation between this approach and more post-operative bleeding. In spite of their being no need to control bleeding in the operation room, a paediatric patient experienced secondary hemorrhage on day 5 of the case series. To reduce this occurrence, strict adherence to the post-tonsillectomy procedure is required.

Keyword: LigaSure, Tonsillectomy, post-operative haemorrhage

Introduction

Tonsillectomy is an operation that ORL-HNSs frequently do across the world, particularly in Indonesia. Tonsillectomy is frequently recommended for those who have sleep disordered breathing (SDB) and recurring throat infections. SDB has been associated with worsening behavior, quality of life, and academic achievement. There is evidence that children with repeated infections function poorly physically and have worse overall health. Because of this, tonsillectomy helps prevent the morbidities indicated above.^{1,2,3}

The danger of hospitalization, anesthetic hazards, postoperative discomfort, and high medical expenditures are all significant with a tonsillectomy. Tonsillectomy procedures have been carried out since the year 30 AD. Numerous procedures have been documented and are still being developed; some are preferred by surgeons. Major bleeding is one of the most frequent post-tonsillectomy issues, and it has caused anxiety and panic in many of my coworkers. As we require pharyngeal musculature and blood vessel constriction to spontaneously clamped blood vessels, secondary healing, which has been frequently meant in wound healing, may lead to bleeding. Both primary and secondary hemorrhages (surgery performed within 24 hours) are possible. Primary hemorrhage incidence varies from 0.2-2.2%, whereas secondary hemorrhage incidence ranges from 0.1-3%.¹ To increase safety, patient care, and cost-effectiveness, surgical technique has to be regularly evaluated. These methods may be roughly divided into two categories: cold steel and coagulation process.^{1,2} In Indonesia, we employ both

knot-tying and cold-steel dissection. Additionally, a lot of medical professionals indicated interest in surgical methods and equipment to facilitate this process. According to a 2014 American Academy of Otolaryngology survey, electrocautery (55%) is recommended over cold steel procedures (only 10%)¹. According to a research by Patel from 2022, electrocautery is now the procedure of choice in America³, despite the fact that certain studies have linked this method to a higher VAS score and subsequent hemorrhage.^{1,4} and still remain on controversial until now^{3,5}. Electrocautery become popular because its capability to reduce operative time compared to cold steel^{2,3,4,5}.

Because of its adaptability and safety, LigaSure [Bipolar Vessel Sealing Device (BVSD)] has been used in several surgical specialties. The BVSD device was first created for abdominal surgery to safely and appropriately seal blood vessels up to 7mm. By applying the proper amount of mechanical pressure and bipolar energy to the blood vessel wall, this device coagulates the elastin and collagen.^{2,6,7,8} At temperatures between 60 and 70 oC, BVSD denatures protein with heat energy contained within the forceps and no tissue injury to the surrounding area. By pushing the cut button, the bipolar clamp with a sharp blade put into each clamp is opened. In several studies, an energy device attached to the LigaSure probe that is able to offer precise power distribution has demonstrated its superiority to alternative electrocoagulation devices in terms of reduced operating time and postoperative bleeding.^{2,6,7,8} and pain^{6,7,8} in contrast to conventional electrocoagulation. This tool has been employed in neck dissection, thyroidectomy, and parotidectomy in the field of the head and neck.^{5,9} LigaSure has a very low learning curve and is quite simple to use, making it a highly fascinating tool for preventing surgical complications.

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Many surgeons from another department of our institution are highly interested in this equipment and strongly recommend getting one because of its advantages. Additionally, our colleague advocates using LigaSure for ORL-HNS procedures. The author discovered that LigaSure was referenced in a publication as a tool for tonsillectomy. As a result, we would like to share our tonsillectomy experiences with LigaSure in this case series.

Material and Method

From January to June 2022, this study was carried out at the RSU PKU Muhammadiyah Bantul Hospital in Bantul, Yogyakarta, Indonesia. Samples from all patients were required for tonsillectomy procedures for a variety of reasons. Due to subject restrictions, case series design was chosen.

LigaSure (Covidien/MedTronic) has been utilized in conjunction with the standard cold dissection surgical set. The usage of a long or short jaw probe depends on the surgical needs. Before the surgery began, the anesthesiologist performed general anesthesia with oral or nasal intubation. In contrast to a typical tonsillectomy, there is no special preoperative preparation. Antibiotics provided as a preventative measure lower the chance of infection.

Our hospital's LigaSure series is designated ValleyLab LS10 and has an isolated output operating at a frequency of 400 kHz sinusoid and around 12 Watts of power in a range of 90 to 132 volts. It features two alarm tones; the first one alerts the surgeon whether coagulation was performed flawlessly, while the second one warns of coagulation failure. When a failure tone alerts, the surgeon must determine if there is anything interfering with the coagulation process. Additionally, it contains technology to minimize collateral tissue damage and limit power supply to damaged tissue, thus if we hit the coagulation button after hearing the successful coagulation tone, nothing happens.

Our surgical methods begin with a sharp incision on the anterior-superior pole with a sickle blade, locating the tonsillar fascia and pharyngobasillar fascia before combining a sharp and blunt dissection with cold steel and moving toward the inferior pole. Utilizing a clamp on the inferior pole and a thermal energy button, LigaSure may safely cut and ligate inferior margin

tonsillectomy. When the energy generation device's feedback signal beeps, the marking area is properly coagulated. To

complete dissection, the cutting button was then pushed. This treatment removes both tonsils. Any bleeding that develops on either side of the tonsillar fossa is managed by clamping the region, then by hitting the power button after that but before pressing the cut button. The surgeon next applied pressure with some gauze and checked for any remaining blood. Before signing out, the surgeon and anesthesiologist check for any bleeding. Once agreement was obtained, the tonsillectomy was completed.

Following surgery, we assess blood loss, surgical time, and any noteworthy findings are included in the operation report. Scores on the VAS were acquired once the individual regained consciousness. There are provided common medications such tranexamic acid, H2-blockers, and painkillers. Patient is lying on his or her side and is also given a cold liquid diet. If there are no issues, the patient is released from the hospital the day following surgery and is instructed to return to the hospital three and seven days later. A painkiller and an oral antibiotic are administered. The subject was also instructed not to eat anything hot or gritty for seven days following surgery. During follow-up, all complaints and clinical results are documented.

Results

Patients at our hospital are admitted from the emergency room and polyclinic. There were just 8 patients that needed tonsillectomy from January to June 2022. the COVID-19 epidemic, which limits hospital visits, has limited the subject. Recurrence is the most common indication, while OSAS and peritonsillar abscess are often present. Some patients were encouraged to have tonsillectomies but chose not to. The technique utilized in this case series is a combination of the aforementioned cold dissection and electrocoagulation.

Data characteristic from this study showed age ranges from 8-27 years old, with Male-female ratio is 2:1. Blood loss mean (mL) 192,5; Operative duration is 30±15,8 minute; VAS score post-operative: 3,5±1,3; day 3: 2,5±1,2; day-7: 1. There is one outlier data that inferred statistical value.

Age	Sex	Blood Loss (mL)	Operative duration (min)	VAS Score			Tonsillectomy Indication
				Post-op	Day 3	Day 7	
17	F	25	30	3	2	1	Recurrency
24	M	1000	60	6	5	1	Recurrency, OSAS
27	M	50	30	2	2	1	Abscess
8	M	30	25	3	2	1	Recurrency
19	M	25	15	4	2	1	Recurrency
8	F	25	20	3	2	1	OSAS

Tabel 1. Subject characteristic

One patient is taking anticoagulants and has a ventricular septal defect. Subject is required to cease taking medicine for three days in a

row. With a normal International Normalized Ratio (INR), a tonsillectomy was conducted. Fortunately, no significant bleeding has happened.

One male patient's 103 kg, broad base of the tongue, and mallampati class 4 made intubation challenging. Due to the big tongue and edema in the palate and uvula caused by the difficult intubation, we had to introduce a nasogastric tube and pull it out

through the mouth to aid maintain operative vision. When the tonsils were dissected, a 3 mm artery tore in the superior and inferior poles of both tonsils, causing severe bleeding that LigaSure was able to stop. 1000mL of blood were lost in this incident. There is no need for a surgical knot to stop the bleeding. Despite receiving enough painkillers before surgery, this patient still has a VAS of 6-7. There are no reports of secondary bleeding.

One 9-year-old patient reported experiencing a subsequent hemorrhage five days following the procedure. The patient was subsequently sent to the hospital's emergency room for resuscitation. Under the care of the emergency department, there was no hemorrhage that was life-threatening. We made the decision not to use the operating room following the administration of the appropriate medicine and successful conservative treatment. Leukocyte count increased, and during this event, hemoglobin dropped from 11,4 mg/dL to 9,7 mg/dL. The results of the investigation indicate that post-operative infection and poor adherence to the recommended post-operative diet are likely. In reaction to this incident, the infection prevention and control department has been notified.

One male patient, 27 years old, was admitted from the outpatient department with a peritonsillar abscess. Painkillers, an anti-inflammatory, and a double antibiotic were administered. Tonsillectomy was done on day three. Pus appeared as we dissected toward the inferior pole; LigaSure was used to securely complete the treatment; no surgeon knot was required. LigaSure could securely regulate any bleeding even when dealing with delicate tissue.

Discussion

530.000 children in the United States of America get tonsillectomy surgeries each year, making it one of the most frequent procedures carried out by ORL-HNS surgeons. Because a tonsillectomy is a one-day surgical operation, effective bleeding and pain management are essential.^{3,10,11}. Numerous research on this subject are still being conducted today.

Despite further successful operations, tonsillectomy remained a significant procedure with a considerable risk. According to a study done in 2022 by Patel et al., the incidence of post-operative hemorrhage in the United States is 13.1%. The primary cause is secondary hemorrhage, which accounts for the majority of visits to the operating room (59,5%). To reduce the danger of a tonsillectomy, the surgeon must be aware of all the elements that affect its success. Smoking is linked to impaired blood flow, damaged mucosa structure, and decreased tonsillar bed healing. In adults who smoke, this can impede the healing process and be related to post-operative bleeding.^{3,11}. Many surgeons continue to be concerned about post-operative bleeding, thus it is crucial to continue to improve surgical technique from both the standpoint of the surgeon and the patient.^{2,3}.

s conclusion.

Because secondary hemorrhage can happen outside of a hospital and requires special care, it becomes a terrifying occurrence. It continues to be a common patient complaint. A guide is required since the choice to go back to the operation room must be simple. The types of bleeding were as follows: Type I: No action is necessary; Type II: Bleeding is stopped locally; Type III: Bleeding is treated in the operating room; Type IV: External Carotid LigaSure is necessary; Type V: Death^{2,11}. Local remedies for this issue include gargling with chilly water, applying ice to the neck, and using tanno-gallic acid and silver nitrate¹⁰. One patient experienced a subsequent hemorrhage on the fifth day. We chose to manage the post-operative hemorrhage with ice first, followed by the appropriate medicines. After two days, the patient was released and given new post-tonsillectomy instructions. Our study revealed two probabilities: failure to follow the post-operative meal plan and post-operative infection.

Conclusion

Because it is more adaptable and reduces burn lesion, which will effect VAS Score, the author likes to combine cold steel and electrocoagulation procedures. Compared to the electrocoagulation approach, the cold steel technique offers the advantage of finding a precise surgical plane. Once at the lower pole, LigaSure was applied. Because the tip of the short/long jaw is bulkier than the tip of the conventional bipolar or monopolar jaw, it cannot be used at the beginning of dissection.

Our experience indicates that the key place is inferior, where the inferior pole may occasionally cling to the base of the tongue. This part is extremely difficult, and when tongue base hemorrhage occurs, a surgical knot may not hold. Low-quality suture thread, a scrub nurse's inability to tie a secure knot, or extubating a patient when they become awake and begin coughing can all lead to surgical knot failure. The quality of suture thread might vary from one brand to another. When we tie a surgical knot, we also see some thread begin to fall apart. One of the most widely used energy-generating devices nowadays is LigaSure. Numerous other coworkers adore it and regularly employ it to support various medical operations in operating rooms. It is well-liked because of its adaptability, capacity to shorten working times, safety to ligate blood arteries up to 7 mm, and low collateral damage in comparison to other devices. According to a manufacturer's internal publication, LigaSure produces less heat than a normal monopolar electrocoagulation device (79,6 2,4 versus 123,9 10oC). Less heat implies there will be less local and collateral tissue damage, which can aid in healing and post-operative discomfort. According to a Besser et al. research from 2022, ligaSure can shorten operations without significantly altering post-operative pain levels when compared to cold steel method. In other divisions, a lot of literature has appeared, however in the ORL-HNS discipline, it is still hard to find study opportunities on LigaSure as a subject. When the author was researching this study, there was just one other publication that discussed the use of this device during tonsillectomy surgery, which made the topic intriguing.

According to our perspective, one patient's slightly higher VAS score may have been due to a longer jaw probe rather than a short jaw. In our experience, longer jaws resulted in a somewhat longer coagulation time than shorter jaws. However, further research is required to support thi

Despite the various difficult situations encountered, LigaSure has a position to support an ORL-HNS surgeon throughout a tonsillectomy treatment. It can cut down on recovery time after surgery.

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