

# Use of the Vessel Sealing System in Tracheostomy

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**ABSTRACT:** **Background:** Tracheostomy is a frequent, and at times semi-urgent, surgical procedure. It is performed in close proximity to the thyroid gland, and in many cases requires division of its isthmus, putting a patient in danger of significant bleeding. **Objectives:** To examine prospectively the feasibility of vessel sealing in tracheostomy. **Methods:** A vessel-sealing device was used in 24 consecutive patients undergoing tracheostomy. There were no exclusion criteria for enrolling the patients. No other hemostatic technique was used for dividing the isthmus. **Results:** There were no bleeding events throughout the post-operative period. The operating time saving was 5–10 minutes. **Conclusions:** Use of the vessel sealer was found to be straightforward, efficacious, rapid and safe.

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**KEY WORDS:** tracheostomy, open tracheotomy, hemostasis, vessel sealing

The vessel sealer is a bipolar electro-surgical device capable of sealing vessels up to 7 mm in diameter by denaturing collagen and elastin within the vessel wall and surrounding connective tissue [1]. Clinical studies in various surgical disciplines have demonstrated its efficacy and safety and shorter operative time [2,3]. Lepner and Vaasna [4] found that the mean operating time for lobectomy, subtotal thyroidectomy and total thyroidectomy was significantly shorter with a vessel sealer compared to conventional suturing. The average saving in operating time in the vessel sealer group was 25.8 minutes with a relative reduction of 26.6%. The incidence of transient hypoparathyroidism was also significantly lower in the vessel sealer group. Describing their experience with 317 vessel sealer thyroidectomies, Ashkenazi et al. [5] reported no bleeding events, thermal damage to the recurrent laryngeal nerve, or increased incidence of hypoparathyroidism. Overall, the use of vessel sealing in thyroid surgery was encouraged due to fewer complications and shortened operating time and hospital stay [2,6-9]. Prokopakis et al. [10] pioneered the use of vessel sealing in parotid surgery. In their series of 12 superficial parotidectomies the mean time gain was 52 minutes, with no complications except for a single case of transient facial weakness. These researchers also performed 108 ligasure tonsillectomies, demonstrating a remarkable decrease in postoperative pain and operating time, as compared to cold

knife tonsillectomy [11]. Vessel sealing was also advocated in laryngectomy and neck dissection [12]. The use of this device in tracheostomy has not been previously reported. We report our experience in 24 cases of tracheostomy.

## PATIENTS AND METHODS

The LigaSure™ Vessel Sealing System (Valleylab, Boulder, CO, USA) was used in open tracheostomy by a single surgeon (A.Y.) during a 6 month period. Patients who were not suitable for percutaneous dilation tracheotomy were included in the study group. There were no exclusion criteria for using the device. The control group comprised matching patients who underwent open tracheostomy with the conventional clamp and sutures technique in isthmotomy/isthmectomy by the same surgeon. The operating time was compared between the two groups.

In our practice, a routine isthmotomy/isthmectomy is performed to facilitate tracheal exposure during tracheostomy and cannula reinsertion in the case of accidental decannulation in the early postoperative period. After thyroid isthmus exposure and its undermining in a plane of Berry's ligament the vessel sealer was used for isthmectomy, applying a single sealing line at the midline in one or more steps depending on the isthmus width [Figure 1]. The isthmus stumps usually shrink sufficiently to expose the anterior wall of the trachea. If needed, limited dis-

**Figure 1.** Isthmotomy with the vessel-sealing device



section of the isthmus away from the trachea can be performed, followed by an additional sealing line to provide isthmectomy. No other hemostatic technique was used for dividing the isthmus. Additionally, the vessel sealer is used for hemostasis when indicated during the operation, so that standard diathermy is not necessary. The operating time was measured from incision until opening of the trachea window. The latter cutoff time was chosen because in certain cases a permanent stoma is created requiring additional operating time independent of previous surgical steps. The operating time gain and postoperative bleeding events were evaluated prospectively and compared to the control group.

## RESULTS

The study group comprised 24 consecutive patients (14 males and 10 females) who required open tracheostomy. The patients' ages ranged from 28 to 88 years (mean 66 years). Prolonged mechanical ventilation was an indication for the procedure in 21 patients. One patient underwent tracheostomy for obstructive tumor of the larynx, one for recurrent aspirations and another because of respiratory failure due to ankylosing spondylitis.

No bleeding events were noted throughout the postoperative period in the study group. The operating time saving was 5 to 10 minutes as compared with the control group.

## DISCUSSION

Bleeding is a major complication in tracheostomy. Delaney and co-researchers [13] systematically reviewed and quantitatively synthesized randomized clinical trials to compare percutaneous with surgical tracheostomy and found an overall 5.7% incidence of clinically relevant bleeding. We did not compare our use of vessel sealing with the traditional methods, but we had no case

of bleeding complication in this series. While isthmectomy or isthmotomy are routinely performed in our department, in selected cases the thyroid isthmus may be retracted cephalad and a tracheostomy performed without hindrance. Yet, isthmectomy or isthmotomy allows better exposure and potentially reduces the risk of bleeding by avoiding constant friction of the cannula with the highly vascular thyroid tissue [Figure 2]. Isthmus manipulation with cold instruments is time consuming, whereas vessel sealing is more rapid. We have found this method particularly useful when the thyroid isthmus is bulky, inferiorly located, and when the approach to the inferior border of the isthmus and the inferior thyroid venous plexus is difficult due to kyphosis, morbid obesity, or scarring in the suprasternal area from previous surgery. In these cases a stepwise superior-to-inferior isthmectomy is a safer way to expose the trachea.

## CONCLUSIONS

Use of the vessel sealer was straightforward, efficacious, rapid and safe. We recommend this modality for open surgical tracheostomy.

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**Figure 2.** Trachea exposure after isthmotomy

