

## Utilization of harmonic scalpel for hemiglossectomy in carcinoma of the tongue

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### ABSTRACT

Hemiglossectomy using monopolar diathermy is the conventional surgical treatment of choice for carcinoma of the tongue. Unnecessary and troublesome bleeding is quite often associated with the modality, although a careful identification and ligation of lingual artery can render the surgery less bloodless. Currently harmonic scalpel which is one of the modern modalities is being employed in surgical excision of tongue carcinoma. The mechanism of harmonic scalpel involved the combination of coagulation and cutting effect making glossectomy fast, simple and bloodless. We report a case of 62 years old patient who had right hemiglossectomy using harmonic scalpel for carcinoma of the tongue. The mechanism and advantages of harmonic scalpel modality over conventional modalities are discussed.

**KEY WORDS:** Surgical instrument, Glossectomy, Tongue carcinoma.

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### INTRODUCTION

Glossectomy is always the treatment of choice for carcinoma of the tongue with satisfactory local control.<sup>1-3</sup> Various conventional modalities such as steel scissors, monopolar diathermy and CO<sub>2</sub> lasers have been utilized to cut the tissues with their expected complication of troublesome bleeding

with effects on wound healing.<sup>4</sup> These modalities have some limitations and bleeding still remains a problem in glossectomy. Bleeding from large vessels cannot be controlled by CO<sub>2</sub> laser and diathermy during dissection except by ligation, plication or clipping.<sup>5</sup>

Harmonic scalpel is one of the ultrasonic activated surgical instruments which are currently being utilized for abdominal surgery, thyroid and parathyroid surgeries. Its usage for glossectomy is still not widely practiced.

### CASE SUMMARY

A 62 years old Malay gentleman with background history of hypertension and diabetes mellitus presented with one year history of right sided tongue swelling which progressively increased in size. Initially it was painless but became painful about two months prior to presentation. It was associated with ulceration and occasional bleeding from the ulcer. At presentation he can only tolerate liquid diet. There were no neck swellings and any features suggestive of distant metastasis. He was a chronic smoker for more than forty years with betel nut chewing.

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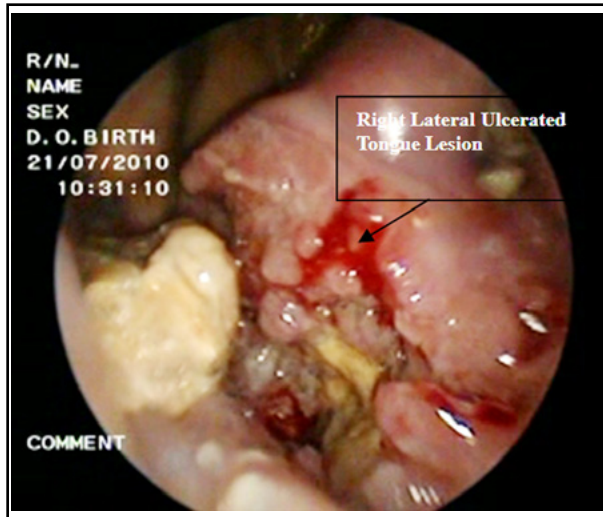


Fig.1: Intraoral picture of the lateral border of tongue ulcerative lesion.

Examination revealed a middle age man not in respiratory distress with right lateral ulcerated tongue mass, not crossing midline measuring 5 cm x 5 cm. The ulceration has elevated edges with mild bleeding and some necrotic tissue (Fig.1). Posterior third of the tongue and retromolar trigone were spared but the floor of the mouth was involved. There was no restriction of tongue movement. Cervical lymph nodes were not palpable. Tissue biopsy of the mass revealed well-differentiated squamous cell carcinoma. Computed tomography showed right lateral border of tongue tumour (Fig.2) with bilateral cervical lymphadenopathy and multiple submental lymphadenopathy with the largest diameter being 0.9cm. A diagnosis of

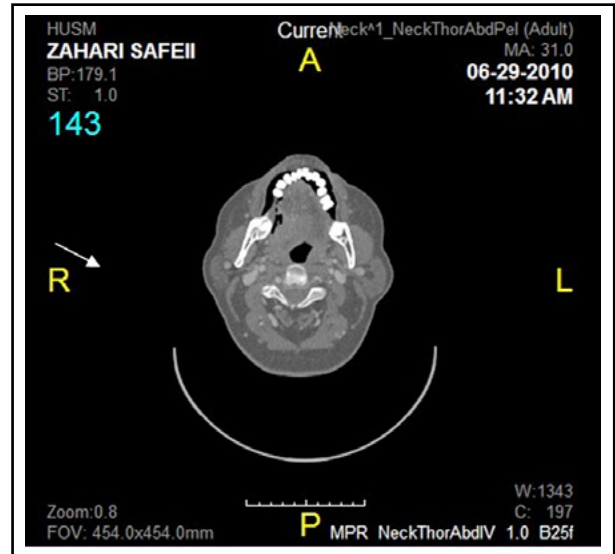


Fig.2: CT scan showed ulcerative lesion of the right lateral border of tongue at its mid portion with tumor mass not crossing the midline

right border of tongue carcinoma was made and the patient underwent right hemiglossectomy using harmonic scalpel with right floor of mouth excision. To ensure complete tumour clearance, access was obtained by midline mandibulotomy and right supraomohyoid neck dissection also was performed (Fig.3). A two cm surgical margin of glossectomy was taken. Tongue defect was closed by rotation of anterior tip of the tongue.

Postoperation was uneventful and patient was commenced on chemoradiotherapy. Patient was seen six weeks postoperation in follow up visits and showed good recovery (Fig.4).

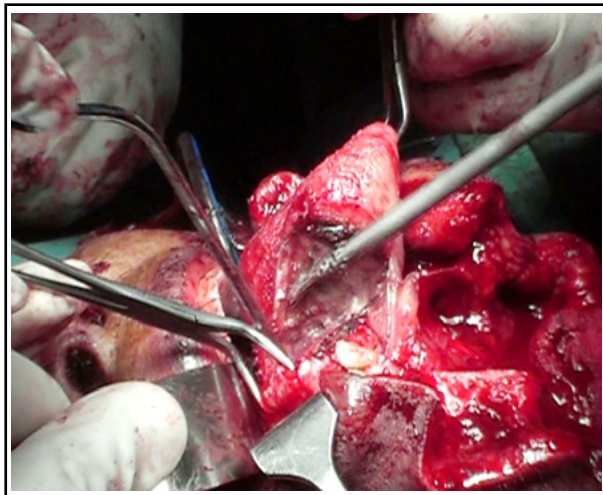


Fig.3: Intraoperative picture of resection of tongue by harmonic scalpel.



Fig.4: Postoperative intraoral picture at 6 weeks.

## DISCUSSION

The conventional main treatment of cancer of the tongue is partial or total glossectomy using monopolar diathermy. Local tumour control is satisfactory with glossectomy.<sup>1-3</sup> Tongue is a highly vascularized organ of which the resection requires good hemostasis. In recent years ultrasonic activated surgical instruments are becoming popularised in head and neck region due to their added advantages over the conventional instruments. Harmonic scalpel is one of the ultrasonic activated surgical instruments which are popularly utilized for abdominal and thyroid surgeries. Its usage for glossectomy is not widely practiced despite its added advantages over the conventional surgical instruments mentioned above.

The mechanism of this instrument is based on generation of high-frequency harmonic motion of metallic rods which break hydrogen bonds and denatures proteins at the tissue interface with resultant sticky coagulum that seals off blood vessels. Other ultrasonic activated surgical instruments are ultrasonic scissors, ultrasonic scalpel and ultrasonic coagulating shears. These instruments have been routinely utilised in endoscopic abdominal and thoracic surgery due to their excellent combination of coagulation and cutting effects where conventional diathermy and ligature methods are difficult to apply.<sup>5</sup> Hemostasis of vessels 6-7mm can be achieved with ultrasonic instruments by using the low amplitude coagulating mode while most effective cutting effect is achieved if amplitude of vibration is set to full power.<sup>5</sup> Ligation of lingual artery using ultrasonic scissors has already been reported.<sup>6</sup>

Another design of ultrasonic activated surgical instruments is the ultrasonic hook. It is used in tonsillectomy, parotidectomy, submandibular sialoadenectomy.<sup>7-10</sup> It was also reported that ultrasonic hook was used for glossectomy.<sup>11</sup> The advantages of ultrasonic surgical instruments include better hemostasis, less postoperative pain and facilitation of minimally invasive endoscopic surgical approach in these head and neck operations.<sup>5</sup>

Glossectomy with harmonic scissors is performed by grasping the tissues with the scissors and pressing the foot on the pedal without any interruption for hemostasis due to the hemostatic property of the ultrasonic scissors.<sup>5</sup> The most advantageous point about this instrument is doing an operation in a bloodless field, very easy and fast. Yuen et al<sup>5</sup> noted

that the use of monopolar diathermy and CO<sub>2</sub> laser in partial glossectomy requires intervention to secure bleeding due to their less hemostatic efficacy than ultrasonic scissors thus prolonging operation time to about 1 to 2 hours. In addition to its poor hemostatic property, CO<sub>2</sub> laser glossectomy is a difficult procedure with high risk of postoperative bleeding<sup>12</sup> especially when it involved the tongue base with abundant blood vessels. It was recommended by Metternich et al<sup>13</sup> that in the course of glossectomy vessels up to 1 mm including lingual vessels should be ligated. These were noted in their case series of 25 glossectomies performed using harmonic scalpel.

The use of the triple-seal technique using harmonic scalpel adjusted to 60% power to cut and seal lingual vessels including other larger vessels was described by Yuen et al.<sup>5</sup> In this technique the vessels were sealed in two adjacent sides of the cutting point without division of the vessel by applying the ultrasonic scissors for 3 to 4 seconds before the vessel was divided at the center. In a study to compare the efficacy of ultrasonic energy in hemostasis over other modalities, Harold et al<sup>14</sup> demonstrated that ultrasonic scissors can safely seal off vessels up to 3 mm in diameter with a bursting pressure of 226 mmHg, 4 to 5 mm diameter with a bursting pressure of 205 mmHg, and 6 to 7 mm with a bursting pressure of 175 mmHg. Harmonic scalpel releases about 80 degrees heat with resultant much less damaging effect to tissue compare to steel scalpel, monopolar diathermy, bipolar diathermy and CO<sub>2</sub> laser.<sup>4</sup> Ultrasonic scalpel surgery has more rapid resolution of inflammation and tissue reepithelialization and strong tensile strength of the wound compared with CO<sub>2</sub> laser, monopolar diathermy and bipolar diathermy as was demonstrated in guinea pig oral mucosa.<sup>4</sup>

Our patient had an uneventful postoperation period and wound healing. It has been reported that postoperative tonsillectomy pain using harmonic scalpel is reduced compared with diathermy.<sup>15</sup> This is attributed to reduced tissue damage when using harmonic scalpel. Postoperative glossectomy pain using harmonic scalpel was minimal compared to diathermy and CO<sub>2</sub> laser as reported by Yuen et al.<sup>5</sup> However, the question of benefit in pain reduction compared to monopolar diathermy cannot be addressed in their study due to the limitation in sample size. The postoperative pain in our case was tolerable to the patient with paracetamol analgesic.

In conclusion, the harmonic scalpel has few advantages that can be offered in performing

glossectomy. These include duration of operative time is shortened, surgery is bloodless and better recovery in term of wound healing and early oral feeding. The technique and know-how of using this millennium instrument is of paramount importance to achieve the desired effect.

## REFERENCES

1. Yuen APW, Wei WI, Wong YM, Tang KC. Comprehensive analysis of results of surgical treatment of oral tongue carcinoma in Hong Kong. *Chinese Med J* 1997;110:859-864.
2. Yuen APW, Wei WI, Lam LK, Ho WK, Kwong D. Results of surgical salvage of locoregional recurrence of carcinoma of the tongue after radiotherapy failure. *Ann Otol Rhinol Laryngol* 1997;106:779-782.
3. Yuen APW, Wei WI, Wong SHW, Ng RWM. Local recurrence of carcinoma of the tongue: patient prognosis. *Ear Nose Throat J* 1998;77:181-184.
4. Sinha UK, Gallagher LA. Effects of steel scapel, ultrasonic scapel, CO<sub>2</sub> and monopolar and bipolar electrosurgery on wound healing in guinea pig oral mucosa. *Laryngoscope* 2003;113:228-236.
5. Anthony Po-Wing Yuen, Birgitta Yee-Hang Wong. Ultrasonic glossectomy-simple and bloodless. *Wiley Interscience J* 2005;690-695.
6. To EW, Pang PC, Lai AC, Tsang WM. The use of harmonic scapel for glossectomy (letter). *Br J Plast Surg* 2001;54:553.
7. Willging JP, Wiatrak BJ. Harmonic scapel tonsillectomy in children: a randomised prospective study. *Otolaryngol Head Neck Surg* 2003;128:318-325.
8. Kumatsuzaki Y, Ochi K, Sugiura N, Hyodo M, Okamuta A. Video-assisted sialoadenectomy using ultrasonic scapel. *Auris Nasus Larynx* 2003;30:75-78.
9. Markkanen-Leppanen M, Pitkaranta A. Parotidectomy using harmonic scapel. *Laryngoscope* 2004;114(2):381-382.
10. Siperstein AE, Berber E, Morkoyum E. The use of harmonic scapel vs conventional knot tying for vessel ligation in thyroid surgery. *Arch Surg* 2002;137:137-142.
11. Sherman JA, Daviest HT. Ultracision: The harmonic scapel and its possible uses in maxillofacial surgery. *Br J Oral Maxillofacial Surg* 2000;38:530-532.
12. Steiner W, Fierek O, Ambrosch P, Hommerich CP, Krom M. Transoral laser microsurgery for squamous cell carcinoma of the base of the tongue. *Arch Otolaryngol Head Neck Surg* 2002;129:36-43.
13. Metternich FU, Wenzel S, Sagowski C, Jakel T, Koch U. The "Ultracision Harmonic Scapel" ultrasound activated scapel. Initial results in surgery of the tongue and soft palate [in German]. *HNO* 2002;50:733-738.
14. Harold KL, Pollinger H, Mathews BD, Kercher KW, Sing RF, Henifort BT. Comparison of ultrasonic energy, bipolar thermal energy and vascular clips for the hemostasis of small, medium and large sized arteries. *Surg Endosc* 2002;17:1228-1230.
15. Willging JP, Wistrak BJ. Harmonic scapel tonsillectomy in children: a randomized prospective study. *Otolaryngol Head Neck Surg* 2003;128:318-325.