External Carotid Artery Ligation in Squamous Cell Carcinomas of the Oral Cavity and Oropharynx: an Oncological Emergency

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Abstract The purpose of this study is to investigate the outcomes of emergency external carotid artery ligation in head and neck cancer patients. It is a retrospective observational study of 11 patients with oral cavity and oropharynx cancers who underwent external carotid ligation as an emergency procedure. Prior tracheostomy was done in all the patients as part of the procedure. Parameters studied were the efficacy and safety of the procedure in the form of control of haemorrhage, any postoperative neurological deficit, morbidity and mortality. The study evaluates the efficacy of the intervention purely as an emergency procedure, and oncological outcomes have not been reported. Analysis was done using simple frequencies and proportions. The oropharynx is the most common site of tumour bleeding in head and neck malignancies. Bleeding following external carotid ligation stopped in all the patients immediately without any postoperative mortality or morbidity. No patient had any neurologic deficits postoperatively. There was one case of rebleeding. Emergency external carotid ligation in tumours of the oral cavity and oropharynx is a life-saving and simple procedure with limited morbidity. Prior tracheostomy is recommended in all the patients.

Keywords ECA ligation · Emergency external carotid ligation · Oncologic emergency

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Introduction

I shall trust in the future to ligature of the external carotid in such cases, and here I may say that, where the disease is not in the orbit, I cannot see the necessity of securing the common carotid for anastomosing aneurism of the face and head.

George Bushe

Royal College of Surgeons of Ireland

He was the surgeon who first tied the external carotid artery as a preparatory measure, of which a definite record can be found. It was performed in a young patient of about ten and a half years of age to check for severe haemorrhage following the removal of a pulsating nevus from the temporal region. Removal was not attempted, however, until all other recognized expedients had failed. The young patient made a rapid and satisfactory recovery [1].

Today, external carotid artery (ECA) ligation is one of the not-so-common procedures practised. Bleeding is the third most common cause of death in patients with metastatic cancer after organ failure from tumour invasion and infection. Massive arterial bleeding from the mouth may occur as a result of deeply invasive tumours at the base of the tongue eroding into branches of the external carotid artery [2]. However, it may also be seen as a part of bleeding diathesis in leukaemia [3].

On searching the scientific literature, the reported experiences on ECA ligation date back to 1887 where the author Dr. John Wyeth refers to only 67 cases of the procedure reported prior to his publication. However, those were the times when scientific writing was experience-based rather than evidence-based. Surgeons shared their valuable experiences on how they approached the patient and their

Fig. 1 ECA being looped before ligation

perspective of the procedure. In the experience of Dr. John Wyeth and Dr. Joseph Bryant, eight cases of ECA ligation were reported; five of them were due to malignancy of the head and neck region [1, 4].

Methods

This is a retrospective observational study of 11 cases of emergency ECA ligation for the oral cavity and oropharyngeal cancers done at our institute from January 2011 to December 2011. Only emergency ligation was considered, and no patient in the study had planned ECA ligation.

All patients were diagnosed with squamous cell carcinoma (SCC) and were either undergoing or had completed their treatment with curative or palliative intention. All patients had presented with severe oral bleeding in the emergency department. Patients were resuscitated and shifted to the operation theatre after withdrawing blood samples. Emergency tracheostomy was done in all the patients as an institutional protocol as valuable time may be lost during futile attempts in

Fig. 2 Wound after closure

Table 1 Distribution of the primary tumour in the oral cavity and oropharynx

Tonsil	02
Buccal mucosa	02
Anterior tongue	01
Base of the tongue	02
Soft palate	02
Lower alveolus	01
Hard palate	01
Total	11

endotracheal intubation as the field is obscured with clots due to bleeding. Blood was replaced according to the hematocrit level.

Parameters studied were the efficacy and safety of the procedure in the form of control of haemorrhage, any postoperative neurological deficit, morbidity and mortality which may be described as risk of therapeutic benefit obtained by the procedure. The study evaluates the efficacy of the intervention purely as an emergency procedure, and oncological outcomes have not been reported.

ECA was ligated in continuity with silk 2-0 after raising subplatysmal flaps and retracting the internal jugular vein laterally with skin incision over the superior cornu of the thyroid cartilage (Figs. 1 and 2).

Analysis was done using simple frequencies and proportions.

One of the references is in the German language and was translated into English using the software Google translate.

Results

A total of 11 patients were studied. The mean age was 44 years. Nine were males and two were females. The intent

Table 2 Comparing the primary site of tumour with Wurm et al.

	Wurm et al. (only emergency cases)	Our study
Oropharynx	10	06
Tongue	01	01
Floor of the mouth	01	0
Hypopharynx	07	0
Laryngeal	01	0
Hard palate	0	01
Lower alveolus	0	01
Buccal mucosa	0	02
Combined	04	0
CUP syndrome	01	0
Others	02	0
Total	27	11

of the treatment given was curative in seven patients and palliative in four patients. The distribution of primary tumours is seen in Table 1.

Five patients out of 11 had undergone definitive curative surgery, and two patients had received complete curative concurrent chemoradiation. The remaining four patients were on palliative chemotherapy, and three of them had received 12 Gy of haemostatic radiotherapy for previous episodes of bleeding.

Bleeding following ECA ligation stopped in all the patients immediately without any postoperative mortality or morbidity. No patient had any neurologic deficits postoperatively.

However, one patient with tumour in the oropharynx presented 1 month later with rebleeding; opposite ECA was ligated, but the patient did not survive and died 4 days later.

Discussion

The rationale for ECA ligation is based on the fact that the internal carotid artery does not have any branch in the neck and complete blood supply is from the external carotid artery.

There are very few studies in the literature addressing this issue of emergency ECA ligation in head and neck cancers.

In a retrospective German study by Wurm et al. [5], 52 patients underwent ECA ligation, out of which 27 were done as an emergency procedure for various head and neck cancers (Table 2).

One of the major differences in the procedure of the two studies was that tracheostomy was done in all the patients in the present study and also that ECA was ligated flush to the common carotid artery in our study; however, the German study does not mention whether tracheostomy was part of the procedure and the superior thyroid artery (STA) was ligated separately. Also, in our study, all the patients had epithelial malignancies (SCC) of the oral cavity and oropharynx, whereas two cases of other head and neck malignancies were considered by Wurm et al. However, the details of these cases have not been mentioned.

Contrastingly, in the German study, all the three patients who underwent emergency ECA+STA ligation suffered neurologic complications; however, in the present study, there

was no such complication. Also, they reported less morbidity and mortality in patients who underwent prophylactic procedure. We completely agree with Wurm et al., but the most common head and neck cancers which present with bleeding are of the oropharynx where the primary treatment modality is concurrent chemoradiotherapy and prophylactic ligation of ECA is not possible in all the patients; hence, as cancer surgeons, we must be prepared for this complication.

Conclusion

This being a retrospective study with a limited number of patients' inferences derived may not be statistically significant. However, in the light of the above data, we strongly recommend ECA ligation in tumours of the oral cavity and oropharynx as being a life-saving and simple procedure with limited morbidity. We also recommend preprocedure tracheostomy in all the patients. The procedure probably does not provide any oncological or survival advantage in advanced palliative patients of head and neck cancers, but it certainly relieves the stress faced by the family members seeing their loved ones die in a pool of blood.

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