

COMMON CAROTID LIGATION – SURGICAL CHALLENGES AND RESULTS

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COMMON CAROTID LIGATION – SURGICAL CHALLENGES AND RESULTS (Abstract) :
Known as a dangerous procedure, due to its post-operative evolution in most of the cases, the common carotid ligation was performed first on the 1st November 1805 by Astley Cooper. The article begins with a short introduction in the history of the procedure and the instruments used for the improvement of the results. The main objective of the article is to put in balance the risks and benefits of the common carotid ligation procedure. We need to understand the normal anatomy of the neck arteries which supplies all the head and neck organs and also the sites where we can do the procedure as easiest as it is possible. The study was developed in Prof. Dr. D Hociota” Institute for ENT functional surgery and phonoaudiology from 2010 to 2017 on 5 cases. In all of our cases, we used a gradual closure of the common carotid artery with ligation without using a clamping instrument. Most of the patients died after a minimum of four months post-op. One patient survived after the ligation procedure but with some post-op complications. In all the cases we had a minor stroke complication on the same side with the ligation. In conclusion, the common carotid ligation procedure remains hard to choose method because of the post-op complications and high mortality risk. So we may use it only when we have no other options and if we remain without any treatment resources. **Key-words:** COMMON CAROTID ARTERY, LIGATION, VASCULAR CLAMPS, RISKS AND BENEFITS

INTRODUCTION

Known as a dangerous procedure, due to its post-operative evolution in most of the cases, the common carotid ligation was performed first on the 1st November 1805 by Astley Cooper on a patient with aneurysm of the common carotid artery, but on the twenty-first day the patient died, after developing hemiplegia on the eighth postoperative day (1).

Another important person with big contributions in the modern hemostat procedures was Ambroise Paré, who was known for performing war-wound amputations with his instruments such as the “Bec de Corbin” clamp used to grasp a bleeding vessel and ligate it. (2) Although it was reported by deFourmestreaux, we don't have any definite proof, that he performed a common carotid ligation around 1552 on a wounded in a duel patient with a severe lacera-

tion of the internal jugular vein and common carotid artery on the left side. His case report stands as the first published common carotid artery ligation in man (3).

Freeman, in 1921, thinks that the age of the patients and the diversity of the circle of Willis plays one important role in the evolution of the post-op period (4).

In our times this procedure is less common with some limited indications because of the risks which are associated with it.

Years ago the operation was made in the course of surgical ablation in neoplasms of the cervical region, some cases of cavernous sinus thrombosis and injuries (for the control of hemorrhage), a pulsating tumor of the orbit and skull (5).

In this article, we will try to establish and put in balance the risks and benefits of using the common carotid ligation.

ANATOMY OF THE COMMON CAROTID VESSELS

The important thing is to understand the normal anatomy of the arteries because most of the cases, in which we need to use the ligation of the common carotid artery, are including the oncological advanced status of the patients, with the presence of big cancerous tumor processes (6). By the presence of these processes with slow evolution in time, we found out that the circulatory system above the common carotid artery developed some anastomosis (between branches of external and internal carotid artery). The anastomosis between the two common carotid artery systems plays an important role in the post-operative evolution of the patients being a good prognostic in some cases (7).

The two common carotid arteries varies by the origin (left one – branch of the aortic cross while the right one – branch of the brachiocephalic trunk), length, level of bifurcation (which can be from the cricoid cartilage to the hyoid bone, or at the level of the upper border of the thyroid cartilage – considered as the most frequent variant) (1), also Morgagni described a case in which the vessel divides at the level of the root of the neck. In some cases, the common carotid artery has been found to be absent, while the origins of external and internal carotid arteries being directly from the aortic arch (8).

Normally the common carotid artery gives no branches at the level of the neck, but in some cases, branches as the superior thyroid artery, laryngeal branch, inferior thyroid and in rare cases vertebral artery may have the origin at the level of the common carotid artery (9).

SURGICAL TECHNIQUE

Because of the high mortality incidence or cerebral anemia in the cases of the immediate ligation, the surgeons tried to find out and invent, some devices to be used in gradual occlusion of the artery. In 1901 Crile developed a spring-end screw clamp (10). Also a Romanian surgeon, Ghitescu T. developed the Ghitescu clamp for the gradual occlusion of the common carotid artery (11).

If the situation permits to choose the site of the ligation of the artery. We should avoid to tie it at the level of the inferior part of it, because in this segment, the artery is situated deeply in the neck and covered by three layers of muscles and also, on the left side the internal jugular vein passes obliquely anterior to it in most of the cases. Neither the superior end

of the artery should not be selected because in this situation the superior thyroid vein can make the procedure difficult (6).

The best segment for the ligation, if the situation permits, is at the level of the inferior border of the larynx, superior or inferior to the anterior belly of the Omohyoid muscle (7). About the surgical procedure, we need to know that the incision is performed at the level of the anterior border of the sternocleidomastoid muscle is made and the platysma with the superficial and deep fascia is dissected. The sternocleidomastoid muscle is retracted laterally, and the common carotid artery is exposed under the crossing of the omohyoid muscle. The clamp is placed on the artery, and two suture multifilament wire are placed superior and inferior to the clamp. The clamp is slowly screwed for a chosen period depending on the case. After some time passes, the ligatures are tied, the clamp is removed. If some cerebral symptoms appear while the clamp is closing, the jaws of the clamp can be reopened and the blood flow reestablished. (1)

We will present some cases of patients from our institution where we used the common carotid ligation for different tumoral pathologies.

MATERIAL AND METHOD

The study was developed in Prof. Dr. D Hociota” Institute for ENT functional surgery and phonoaudiology from 2010 to 2017 on 5 cases.

As we can see in the photo (fig.1) of the first case with the tumoral invasion at the level of the left common carotid artery. The tumoral process was exposed, and we used two suture multifilament wire for the gradual closure of the vessel (fig.2). We need to have in mind the fact that also because of the presence at that level of the tumoral process, the blood flow above it, was practically reduced. In this case, the tumoral process working as a „clamp” for the vessel. After the gradual closure of the vessel, we made the ablation of the tumoral process (fig.3) and gave the fragments to biopsy(fig.4).

RESULTS AND DISCUSSION

As we can see in the table most of the patients (80%) died after a minimum of four months post-op, but we need to have in mind the patient status (chemoradiation) and the locally advanced stage of the tumoral process on the presentation. Although one patient survived the ligation procedure but with some post-op com-

Common Carotid Ligation – Surgical Challenges and Results

TABLE 1
Clinical cases information

| Case no. | Diagnosis | Indication for ligation | Method of ligation Immediate/ Gradual | Post-op complications | Results |
|----------|---|-------------------------|---|---|--|
| 1 | Carotid body tumor | Tumoral invasion | Gradual in 15 min without clamp | <ul style="list-style-type: none"> • Minor Stroke • Bilateral vocal fold paralysis • Dysphagia | <ul style="list-style-type: none"> • Bilateral Kashima with suppression of the tracheal Cannula • Percutaneous Gastrostomy 4 years after the procedure |
| 2 | Pharyngolaryngeal cancer with massive lymph nodes block-chemoradiated | Hemorrhage | Gradual in 15 min without clamp | <ul style="list-style-type: none"> • Minor Stroke | <ul style="list-style-type: none"> • Death in 4 months |
| 3 | Pharyngolaryngeal cancer with massive lymph nodes block-chemoradiated | Hemorrhage | Gradual in 15 min without clamp | <ul style="list-style-type: none"> • Minor Stroke | <ul style="list-style-type: none"> • Death in 4 months |
| 4 | Pharyngolaryngeal cancer with massive lymph nodes block-chemoradiated | Hemorrhage | Gradual in 15 min without clamp | <ul style="list-style-type: none"> • Minor Stroke | <ul style="list-style-type: none"> • Death in 5 months |
| 5 | Pharyngolaryngeal cancer with massive lymph nodes block-chemoradiated | Hemorrhage | Gradual in 15 min without clamp | <ul style="list-style-type: none"> • Minor Stroke | <ul style="list-style-type: none"> • Death in 7 months |

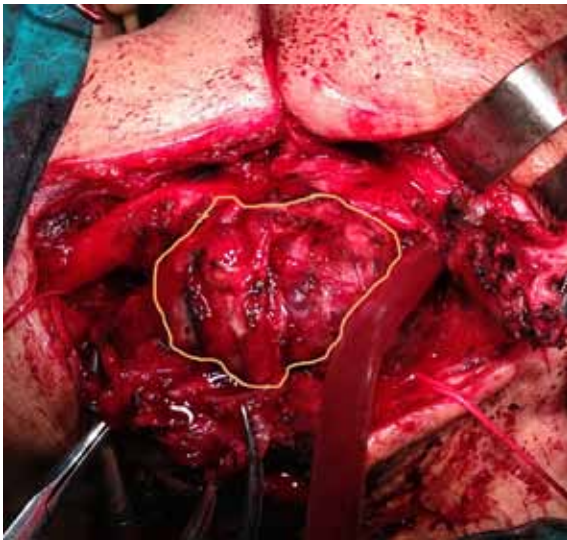


Fig. 1. Left carotid body tumoral process exposed
Tumoral process rounded by orange line

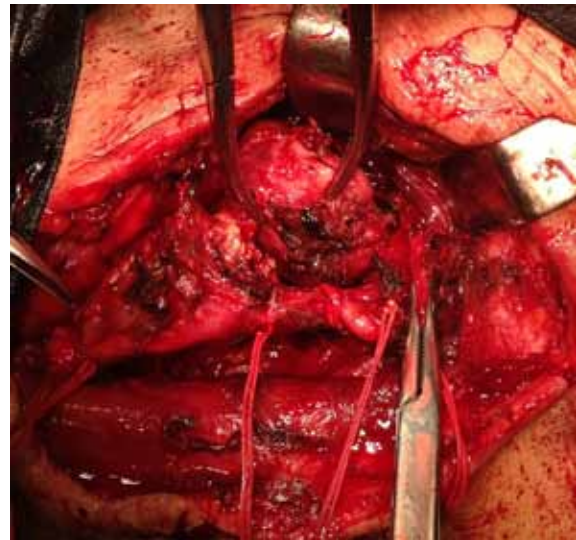


Fig. 2 Multifilament wire for the gradual closure of the common carotid artery

plications as bilateral vocal fold paralyzes and dysphagia. In this last case for the vocal fold paralyzes first we did a tracheostomy with the tracheal cannula insertion, and after this procedure, we made a posterior bilateral cordectomy (Kashima procedure) (12). Although, it is possible to make a modified Kashima proce-

dure (extended to the anterior 2/3 segment of the vocal fold) with good results also (13)(14). For the dysphagia, a Percutaneous Gastrostomy was made four years after the procedure (15). In all the cases we had a minor stroke complication on the same side with the ligation.



Fig. 3. Ligated vessels after tumoral ablation.
Orange arrow – Inferior part of the common carotid artery. Green arrow – Prevertebral muscles



Fig. 4. Tumoral fragments for biopsy exam

CONCLUSIONS

Although there are descriptions of bilateral anastomosis between the two carotid arteries the ligation procedure remains hard to choose

method because of the post-op complications and high mortality risk. So we may use it only when we have no other options and if we remain without any treatment resources.

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