

# Internal Carotid Artery Pseudoaneurysm after Tonsillectomy Treated by Endovascular Approach

## A Case Report

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### Summary

*Surgery on the head and neck region may be complicated by vascular trauma, caused by direct injury on the vascular wall. Lesions of the arteries are more dangerous than the venous one. The traumatic lesion may cause laceration of the artery wall, spasm, dissection, arteriovenous fistula, occlusion or pseudoaneurysm.*

*We present a case of a child with a giant ICA pseudoaneurysm after tonsillectomy, manifested by pulsing mass and respiratory distress, which was treated by endovascular approach, occluding the lesion and the proximal artery with Histocryl. We reinforce that the endovascular approach is the better way to treat most of the traumatic vascular lesions.*

### Introduction

Mortality after tonsillectomy is a rare condition and it has been described in 1 to 1000 and 1 to 170 000 procedures<sup>1-3</sup>. Almost 30% of the deaths are mainly related to the hemorrhage secondary to the lesion of the internal carotid artery (ICA) or the external carotid artery (ECA) and its branches<sup>1,4</sup>.

Inadvertent vascular trauma may occur during surgery on the head and neck area affecting arteries and veins and cause abnormal hemorrhage<sup>5,6</sup>. Venous lesions are well controlled by

compression, tampon and electro coagulation. Arterial lesions are more difficult to control and in general profuse bleeding occurs. The arterial injury may develop arterial laceration, occlusion, spasm, dissection, arteriovenous fistula and pseudoaneurysm. Cerebral embolism may occur during the surgery in ICA lesions. Lesions like laceration, occlusion, and dissection, may resolve after the injury and they can complicate clinically only during the surgical procedure.

If the lesion is not well controlled during the surgery, furthermore hematoma may organize and develop a definite arteriovenous fistula (AVF) or pseudoaneurysm, which can enlarge and cause oral or nasal hemorrhage, as well as a mass that can grow rapidly, mainly in cases of pseudoaneurysm. Pulsation may occur in both situations and a systolic-diastolic bruit is frequent in case of AVF. The growing mass will progressively compress adjacent structures, causing pain and disturbing swallowing and breathing. This is a very dangerous situation, requiring urgent treatment mainly due the airway obstruction<sup>7-9</sup>.

The goal of the treatment is correct the lesion, preserving the carotid lumen, if possible. The direct surgical approach to the pseudoaneurysm is very difficult due to the deep location of the ICA and the anatomical distortion caused by the mass effect<sup>7,8</sup>. Surgical ligation

have a high rate of complications and should include trapping of ICA, that need a cervical and an intracranial approach, occluding the ICA below the ophthalmic artery.

The best treatment is by endovascular approach. In some cases, the ICA lumen can be preserved by using covered stents [10]. If the occlusion of the ICA is necessary, an occlusion test should be done to verify if the polygon of the Willis is patent and efficient to preserve the cerebral vascularization of the ipsilateral hemisphere. Finally, if the polygon of the Willis is not patent, the best decision is by-pass followed by ICA occlusion.

The objective of this study is to present a child with an ICA pseudoaneurysm after tonsillectomy who was submitted to the endovascular treatment.

### Case Report

A 30-month year-old girl was submitted to a tonsillectomy and she was discharged from the hospital in the same day. Five days after, the parents noticed a 1.5 cm right cervical mass with some episodes of fever according to the parents, although not confirmed by the use of a thermometer. The mass did not improve after 10 days of antibiotic therapy, but it continued to increase and a high respiratory distress became evident.

The girl was submitted to a lymph node biop-

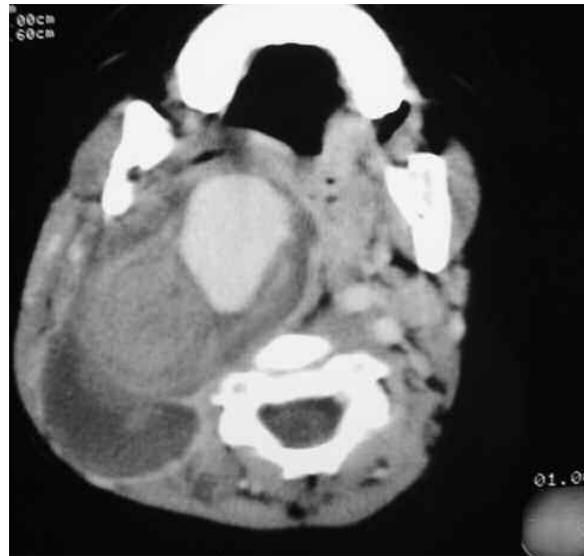


Figure 1 Clinical aspect of the right submandibular mass.

sy which showed an inflammatory reaction. The respiratory distress was getting worse and the girl was brought to the emergency room, when a 10.0 cm right cervical mass was observed on the physical examination (figure 1). Her body temperature was 37°C. The ultrasound (USD) of the neck and the computerized tomography (CT) showed a heterogeneous mass occupying the right carotid space, with different densities and compression of the nasopharynx and left deviation of the midline.

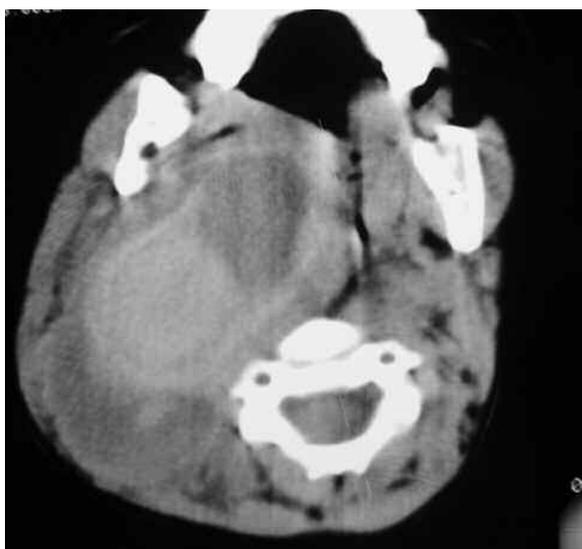


Figure 2 CT without contrast showing the right internal carotid artery pseudoaneurysm and the distortion of the normal anatomy.

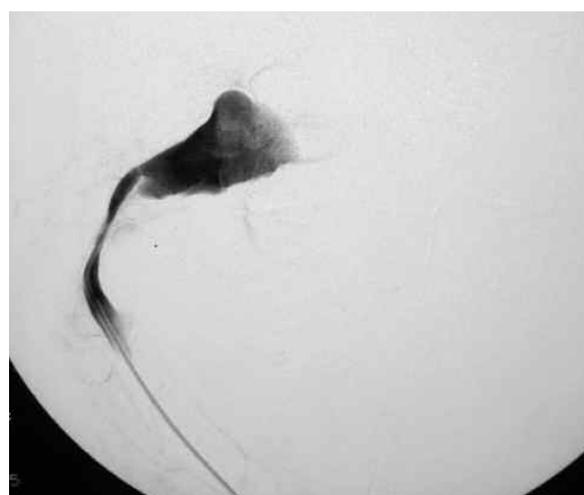


Figure 3 CT image with contrast showing a large mass occupying the right carotid space, with different densities and compression of the nasopharynx and left deviation of the midline. The lesion extends itself to the masticatory, the posterior cervical and parotid spaces.

The lesion extends to the masticatory, the posterior cervical and parotid spaces, with thrombus inside and a cavity with vascular enhancement (figures 2,3). The diagnosis of pseudoaneurysm was done.

The angiogram showed a cervical ICA pseudoaneurysm with a severe compression of the structures nearby. The ICA was occluded above the pseudoaneurysm, with recanalization in their cavernous segment by anastomosis with branches of the right internal maxillary artery. The ophthalmic artery was recanalized through anastomosis with branches of the right ECA, while the distal internal carotid artery and its branches were recanalized through the posterior communicating artery (figures 4-6). The surgeon was immediately consulted, but the surgery was contraindicated at that moment.

The patient was transferred to the Department of Interventional Neuroradiology of the Hospital Beneficência Portuguesa after consultation, to be treated by an endovascular approach. After an angiogram, an 18 micro catheter (Starfast) was placed at the origin of the pseudoaneurysm and then the embolization was performed with a solution of 25% of Histoacryl (NBCA) and 75% of Lipiodol, with a complete occlusion of the lesion and the ICA (figures 7-8). The patient was maintained without tracheal intubation and the respiratory distress decreased in the postoperative period. The hemoglobin and hematocrite increased respectively from 7.8 g/dL and 24.2% before the embolization to 11.5 g/dL and 34.7% in the post embolization period. No neurological deficits were observed after the procedure or during the ambulatory observation. No surgical treatment was indicated to the mass.

### Discussion

Pseudoaneurysm is defined as a complete rupture of the vessel wall with a direct communication between the vascular lumen and a cavity inside of a hematoma. The wall of the pseudoaneurysm is constituted of organized tissue of the hematoma, without vascular wall components<sup>7</sup>.

The most frequent etiologies of cervical ICA pseudoaneurysm are infections, tumors, trauma, surgery and local biopsy. The ICA pseudoaneurysm has been described as a rare complication after tonsillectomy<sup>5-8</sup>.

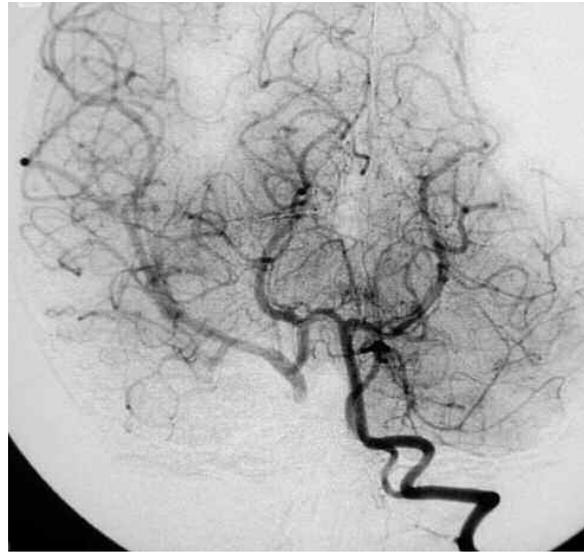


Figure 4 Right ICA, AP view: a large pseudoaneurysm of the distal cervical segment of the ICA, with occlusion of this artery after the lesion.

The symptoms and signs of a pseudoaneurysm are related to a usually rapid increasing mass, with pulsation, rarely presenting bruit, and that can bleed with a potential lethal risk<sup>6,7</sup>. The natural history of the pseudoaneurysm is of maintaining the increasing mass with compression of adjacent structures<sup>6-8</sup>. This distortion and compression of respiratory air



Figure 5 Left vertebral artery angiogram, AP view, showing a large right posterior communicating artery, recanalizing the right ICA and the right middle cerebral artery.



Figure 6 Right ECA angiogram, AP view: recanalization of the ophthalmic and ICA (cavernous segment) through anastomosis with branches of the internal maxillary artery.



Figure 7 X ray, AP view after embolization showing the cast of Histoacryl and Lipiodol into the ICA and the pseudoaneurysm.

pathway and vascular structures can induce brain ischemia and hypoxia<sup>7,9</sup>. Through the surgical approach or even spontaneously through the oral or nasal mucosa, a massive bleeding can erupt and kill the patient<sup>6</sup>.

Because of this potential lethal risk, the treatment must be done the sooner the better. Actually, in the well equipped hospitals the angiogram must be performed as a medical urgency because it is the gold standard to define the local and type of the bleeding, as well as the



Figure 8 Right common carotid artery, AP view after embolization: occlusion of the ICA and recanalization of the ophthalmic and cavernous segment of the ICA.

brain collateral circulation, so a therapeutic strategy can be established<sup>10-14</sup>.

Arterial ligatures should be avoided since they are not always effective and can increase the morbidity, although it has been described to treat mycotic pseudoaneurysm of the extracranial ICA<sup>12</sup>.

The best treatment is the endovascular approach that in general requires the ICA occlusion. Recently, in some selected patients it is possible to preserve the ICA through the use of stents, recovered or not, associated to coils or not<sup>10,13</sup>. The occlusion of the ICA can be done after an occlusion test showing a patent and efficient polygon of Willis in maintaining the pressure and blood flow in the occluded territory. In the case where the patient can not tolerate the ICA occlusion, there is the possibility of a STA-MCA by pass, followed by occlusion of the ICA.

In our patient the ICA was occluded immediately above the site of rupture, determined by hematoma or even by the surgical trauma, and the polygon of Willis was perfectly functional. The treatment of this case was limited to the ICA occlusion which was done by the NBCA. Coils could be used too, but there are more expensive. Detachable balloons are another alternative, but require a bigger guide catheter, with more risk of femoral complications in children.

## Conclusions

ICA pseudoaneurysm is a rare complication of tonsillectomy, and is a life-threatening situation.

The endovascular approach is a well established treatment and the best one for most of these lesions. A careful study of the ICA

pseudoaneurysm and the brain circulation must be performed before establishing the best therapeutic strategy. If the brain circulation can be compromised during the ICA occlusion, then a superficial temporal artery-MCA bypass followed by the occlusion of the ICA can be life saving.

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