



Case Report

# Surgical Removal of a Subcutaneous Cranial

## Site-Migrated Vascular Catheter: A Case Report

Alberto Franzin<sup>1</sup>, Raffaello Bellosta<sup>3</sup>, Lodoviga Giudice<sup>1</sup>, Danilo Aleo<sup>2</sup>, Marco Pavia<sup>4</sup>, M. Morassi<sup>4</sup>, Karol Migliorati<sup>1</sup>, Giorgio Spatola<sup>1</sup>, Oscar Vivaldi<sup>1</sup>

<sup>1</sup>Neurosurgery, Fondazione Poliambulanza Istituto Ospedaliero, Brescia, Italy

<sup>2</sup>Neurosurgery, Dept. of Medical and Surgical Specialities, Radiological Sciences and Public Health, University of Brescia, Italy

<sup>3</sup>Vascular Surgery, Fondazione Poliambulanza Istituto Ospedaliero, Brescia, Italy

<sup>4</sup>Radiology, Fondazione Poliambulanza Istituto Ospedaliero, Brescia, Italy

\*Corresponding author: Dr. Alberto Franzin, Neurosurgery, Fondazione Poliambulanza Istituto Ospedaliero, Brescia, Italy

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### Abstract

A 62-year old patient was brought to our attention following a year-long appearance of a subcutaneous tumefaction in the left parietal cranial site. We identified the distal part of a metal density via caudo-cranial course, crossing from C4, to the left temporal and front cerebral parenchyma, reaching the subcutaneous tissue.

The asymptomatic patient presented with a medical history of mitral valvuloplasty with the subsequent replacement of the valve with a metal prosthesis and a TIA-like episode that occurred one year after surgery. The patient had undergone catheter removal surgery, measuring a total of 17cm, with no particular complications.

**Keywords:** Tumefaction; Cerebral parenchyma; Catheter removal

## Case Report

### History and examination

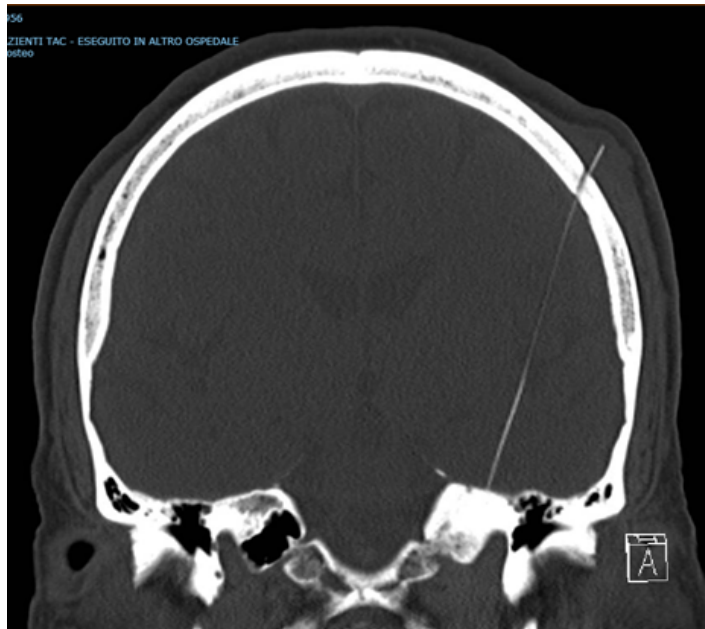
The case reports a 62-year-old hypertensive, dyslipidaemia patient who had undergone percutaneous mitral valve valvuloplasty in 2001, followed by a subsequent replacement of the mitral valve with metal prosthesis in July 2015 at a different hospital. In December 2016, the patient reported an episode of intense and sudden headache, followed by difficulties in speech and asymmetry of the buccal rhyme. Consequently, the patient went to his local emergency room where, after being subjected to various assessments, he was discharged with a diagnosis of TIA. From the summer of 2017, the patient reported the presence of a subcutaneous tumefaction in the left parietal cranial site that he

had noticed after an accidental fall with no evident head injury. Given the persistence of the problem, the patient underwent an ultrasound on the site of the tumefaction in February 2018, which showed a poorly defined hypoechoogenic formation, which had deepened into the skull. The patient was then referred to a specialist neurosurgical examination where he was advised to undergo a neuroimaging study.

In April 2018, the patient had a brain MRI that reported the presence of a linear hypo intense image in all sequences, originating in the left temporal region at the cortical site and reaching the ipsilateral frontal region in the subcutaneous soft tissues; there was also evidence of hyper intensity in the long TR sequences in the frontal region close to the aforementioned image, attributable to a probable gliotic nature.

In order to further investigate the findings, the patient had an CT scan that showed the presence of the proximal end of a one

millimetre metal density wire which, with caudocranial course, crosses from C4 to the left petrous part of the temporal bone, then the left temporal and frontal cerebral parenchyma and the cranial theca, reaching the subcutaneous tissue and causing a focal tumefaction (Figure 1). The patient then turned to our hospital where, after a neurosurgical evaluation and in consideration of recent and remote clinical history and findings, the physicians suggested hospitalization for diagnostic follow-up and appropriate treatment.



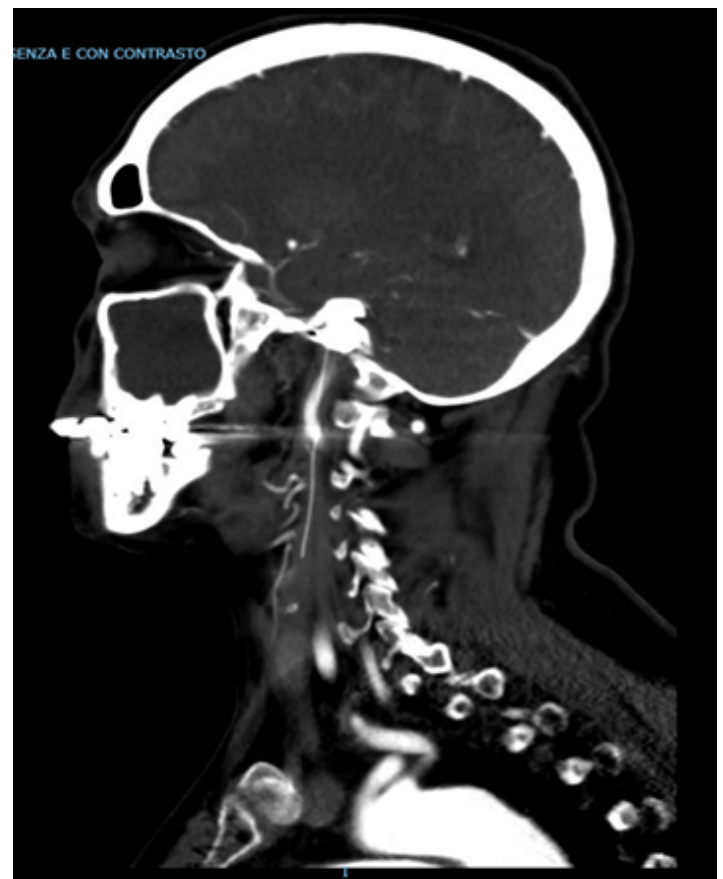
**Figure 1:** Focal tumefaction.

Under our observation, the patient reported subjective mnemonic impairments that he had had for a long period of time, but did not interfere with his personal and working life. He was subjected to a thorough neurological examination, which showed a short-term memory deficit with intact fasia, vigilant patient, collaborating and well-oriented. An electroencephalographic examination showed findings within the normal limits.

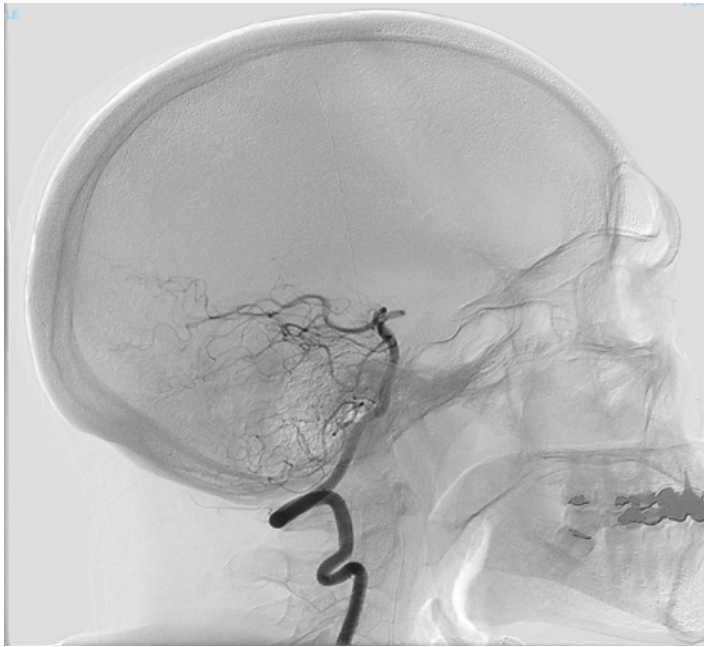
During hospitalization, the patient underwent a head and neck CT scan with and without contrast and CT angiography of the supraortic logs and of the intracranial vessels that reported the presence of spontaneously hyper dense filiform foreign body

located in the left extra-vascular para pharyngeal site near the upper horn of the left thyroid cartilage (Figure 2); it runs cranially in the soft tissues, always with medial localization with respect to the vascular structures, until it reaches the left carotid canal of which it crosses the roof, arriving in the medium cranial fossa. In the intracranial site, the foreign body crosses the temporal-mesial brain parenchyma, the Sylvian cistern and the left inferior frontal gyrus, reaches, crosses the cranial casing at the left parietal bone level (Figure 3), and ends in the soft epicranial tissues.

The left inferior frontal encephalic tissue disposed around the foreign body appears hypointense as for edema / gliosis of entities superimposable to the previous CT control.



**Figure 2:** Left extra-vascular para pharyngeal site near the upper horn of the left thyroid cartilage.



**Figure 3:** Left parietal bone level.

The patient was then subjected to an angiography of the supraortic logs confirming the presence of radiopaque micro guide with extreme proximal in the left parapharyngeal site, cranially parallel to the medial limit of the petrosal portion of the carotid canal, ascending at intracranial level through intrapetrose vascular groove, until it crosses the Sylvian region and emerges at the left retro coronary level with complete transosseous path to reach the galeal dermis. The examination did not exclude that the micro guide could be contained in a caroticotympanic or meningeal branch, even if in the angiographic phases no opacification of the flow around the guide was observed, probably occluding; furthermore, it was not excluded that the guide could transit in the venous sector.

Considering the risk of a possible further migration of the foreign body and its permanence in proximity of the adjacent noble structures, and keeping in mind the previous episodes of symptomatic nature that were likely caused by the path taken, the case was discussed within a multidisciplinary team including a specialist vascular surgeon in order to consider the appropriate surgical removal of the metal wire.

### **Surgical Treatment**

With the patient in the supine position and the head turned to the right, a left fronto-temporal skin incision was made at the subcutaneous tract of the foreign body which appeared to be mobilizable. A small circular craniectomy was then performed around the metal guide with a drill, so that a temporal craniotomy can be carried out without having to mobilize the guide. Under

the microscope, the small hole from which the catheter passed was identified at the level of the petrous part of the temporal bone (the metal guide at this level was covered by a thin catheter). The catheter was dissected with blunt scissors, and the dura mater was then opened at the cranial passage of the guide, which was slowly pulled out. A modest amount of granulomatous tissue was removed at the exit point from the cerebral cortex, and was sent for pathological anatomy analysis. Once the haemostasis was verified, the dura was sutured and the cutaneous muscle flap was reversed. Performing a left latero-cervical incision, we proceeded to careful inspection of the carotid space at the level of the carotid bifurcation exposing the common carotid, the internal carotid and the external carotid. Despite the help of the ultrasound, it was not possible to identify the catheter with confidence, so the removal the second part of the catheter returning to the cranial level was agreed. Identifying the head of the dissected catheter coming out of the petrous part of the temporal bone, we proceeded to remove it slowly finding no resistance and with the control of the vascular team on the carotid artery. Once the dura mater was closed, the bone operculum was fixed and the cranial and cervical wounds were closed in layers, positioning two respective drainages. The recovered catheter, divided into two parts, reached a total of 17 cm.

### **Post-operative care**

The patient remained in intensive care for a regular immediate post-operative care and was returned to our department the following day. During the rest of the post-operative hospitalization, there were some episodes of motor aphasia and sensations of diffused paresthesia in the right hand and the right side of the face for which brain CT scans were performed that showed regular post-operative outcomes and a left-frontal area of hypo density, along the path of the foreign body. The nature of probable simple partial seizures was attributed to the episodes for which steroid and Levetiracetam therapy were set. The patient was discharged on the 18th post-operative day, without the occurrence of new onset neurological deficits and with antiepileptic therapy and resumption of oral anticoagulant therapy.

### **Discussion**

The case discussed represents a rare and serious complication of a previous endovascular procedure during which the involuntary lack of removal of the vascular catheter and its metallic guide wire was evident. Due to the lack of detailed information about the previous operations to which the patient was subjected, it has not been possible to identify precisely from which procedure the error occurred (the patient underwent a mitral valve valvuloplasty in 2001, a mitral valve replacement with metallic prosthesis with open technique in 2015, preceded by coronary angiograms performed during diagnostic evaluation; indeed, it seems probable that the problem emerged after these last procedures, given the concomitance with the onset of neurological disorders).

From a careful review of scientific literature, the retention of foreign bodies following a surgical procedure does not appear to be a rarity [1, 2, 3, 4, 5]. According to a report by the California Department of Public Health (CDPH), the number of adverse events including foreign body retention reported as a result of surgical procedures, from July 1, 2007 to September, 8 2009 was 382, most relating to sponges and instruments, 36 cases involving the retention of whole guide wires or fragments thereof (9.4% of the total number of retained foreign bodies). [1] With the increased use of endovascular techniques, in fact, the inadvertent embolization of catheter fragments, coils and stents has become a rare but serious complication. [2] These events are likely to be underestimated or at least not immediately recognized and may result mostly in accidental findings, being able to cause serious repercussions such as; pulmonary embolism, endocarditis, arrhythmia, cardiac tamponade or even cerebral haemorrhage as in the case report by Petrela et al. [3], the only case found in literature similar to ours.

With reference to the reported case, it appears probable that during one of the previous endovascular procedures, the catheter tract with its guidewire remained in place due to a procedural error related to a forgetfulness rather than a lack of experience from the operator. It is therefore hypothesized that the foreign body had migrated, under the push of the arterial pressure, from the carotid to the soft tissues, and then continued until penetrating the petrous part of the temporal bone of the skull-base and deepen in the encephalic tissue. The thin and sharp constitution of the means, assisted by the pressure boost, has apparently later allowed it to penetrate the skull to reach the patient's subcutaneous tissue in an essentially asymptomatic way, finally allowing the patient to become aware of the foreign body. Since there are no guidelines

regarding the treatment of the removal of intracerebral foreign bodies, the management of these problems is exclusively dependent on the preferences of the surgeon, the cases previously described in the literature and, last but not least, the characteristics of the patient. In our case, the patient was in an advanced age and in general, conditions of good health, he had understood the potential risks and benefits of such an intervention and of the limited cases related to such situations. The patient indeed provided his consent to undergo surgery following discussion with the surgical team.

In subjecting the patient to a good pre-operative care time, we were able to collect information and consider the surgical management of an uncommon complication of an endovascular procedure, which we feel would benefit from the implementation of Perioperative instrument checklist system in order to avoid potentially fatal issues.

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