

Case Report

Chronic headache caused by a titanium fixation plate: Report of two cases

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Abstract

Background: We report two patients with chronic postcraniotomy headache who showed rapid alleviation of pain after removal of titanium miniplates.

Case Description: (Case 1) A 26-year-old woman underwent a right frontal craniotomy and excision of the entire cerebral cavernous malformation. Eleven years later, she developed headache. The titanium plate was removed and the patient presented complete amelioration of headache. (Case 2) A 50-year-old man underwent an aneurysm clipping via the lateral supraorbital approach of the left side. One year later, he complained about throbbing pain. Removing the titanium plate led to complete relief of the headache.

Conclusion: Titanium miniplate fixation may irritate the deep division of the supraorbital nerve and may cause a chronic headache. Here, we propound the idea that, postcraniotomy, titanium miniplates should not be placed above the temporal fusion line.

Key Words: Postcraniotomy headache, supraorbital nerve, temporal fusion line, titanium miniplates

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BACKGROUND

Titanium miniplates have been used for decades as a standard postoperative procedure for the fixation of bone flaps after craniotomy. They provide easy, rigid, and long-lasting fixation. However, a small but significant number of complications have been reported including skin irritation,^[7] ulcer formation,^[5] scalp rupture,^[9] objectionable bulge,^[7,8] and the migration of the titanium hardware through the skull.^[1] This is the first report of postcraniotomy headache caused by mechanical irritation of the peripheral nerve by titanium miniplates. Here, we discuss the etiology of this condition.

CASE REPORTS

Case 1

A 26-year-old, previously healthy woman experienced headache, vomiting, and left hemiparesis in August 2002.

Computed tomography (CT) scanning and magnetic resonance (MR) imaging revealed a probable cerebral cavernous malformation (CCM). She underwent a right frontal craniotomy and an excision of the entire CCM. She was discharged with no neurological complication or headache. In January 2013, she developed progressive dull headache on the right side, and physical examination revealed local tenderness just above the titanium miniplate [Figure 1], without signs of local infection

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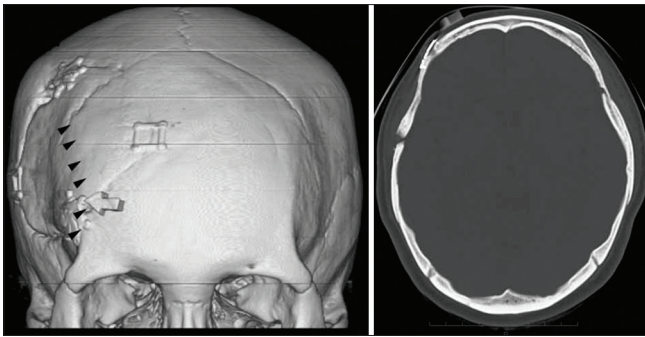


Figure 1: Preoperative 3-D computed tomography (3D-CT) images (left) and skull windows for the migration of the titanium hardware, on axial CT image (right) for the patient in case 1. Arrow indicates the location marked using a plastic eraser and denotes the oppressive point of the scalp and arrowheads indicate the position of the temporal fusion line. The titanium miniplate was placed above the temporal fusion line

that could associate symptoms such as headache. In September 2014, the titanium plate was removed under local anesthesia and the patient reported complete amelioration of headache immediately after the surgery.

Case 2

A 50-year-old man with an unremarkable history developed subarachnoid hemorrhage (SAH) caused by rupture of a saccular aneurysm at the bifurcation of the left internal carotid artery and the posterior communicating artery in April 2014. He underwent an aneurysm clipping via the lateral supraorbital (LSO) approach of the left side and returned to normal life without any neurological deficits; although he felt a mild headache upon discharge from the hospital. In the summer of 2015, he complained of throbbing pain localized to the left forehead. Pressure pain was recorded in the left forehead immediately above the titanium miniplate [Figure 2] without signs of local infection or associated symptoms such as ulceration. In April 2016, the titanium plate was removed under local anesthesia which immediately led to complete relief of the headache.

DISCUSSION

Kaur *et al.* reported that fifteen of the 126 consecutive patients (11.9%) who underwent supratentorial craniotomy, had constant headaches one year after surgery.^[3] These headaches might be produced by traction of the dura^[3] due to scar tissue or fibrous adhesions,^[2] cerebrospinal fluid leakage,^[3] muscle tension,^[2,6] seizure,^[2] intradural bone dust,^[3] or by peripheral nerve entrapment^[2,3,6] by surrounding scar tissue.^[2] To our knowledge, this is the first report of chronic headache due to mechanical irritation of peripheral nerve of the scalp caused by the titanium miniplates.

A detailed mechanism of the cause of the pain is still unknown. However, it is proposed that the metal plate

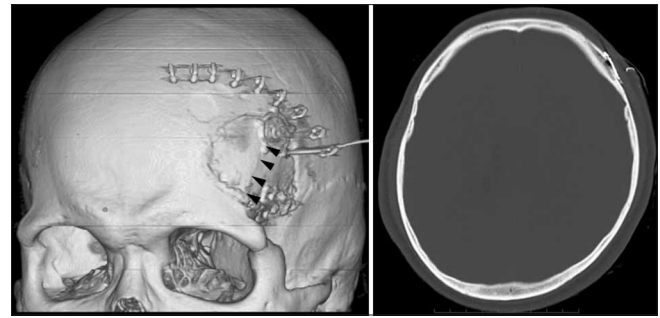


Figure 2: Preoperative 3D-CT images (left) and skull windows for the migration of the titanium hardware, on axial CT images (right) of the patient in case 2. Arrowheads indicate the position of the temporal fusion line. This shows the titanium miniplate just above the temporal fusion line

may directly irritate the sensory nerve or cause an allergic reaction, which may produce local inflammation. However, in our cases, it is reasonable to consider that the titanium miniplate fixation caused irritation of the peripheral nerve of the scalp since both of our patients experienced pressure pain immediately above the plate and were relieved of the postcraniotomy headache by plate removal. The characteristics of pain observed in our patients correspond to those of nociceptive pain, i.e., progressive, long lasting, unilateral, and dull frontal headache with local tenderness just above the miniplate.

It is noteworthy that in both the cases, the titanium miniplate was placed right above the temporal fusion line [Figures 1 and 2]. Knize described that the supraorbital nerve trunk forms superficial (medial) and deep (lateral) divisions, and the deep division passes over the forehead and runs parallel to and between 0.5–1.5 cm medial to the temporal fusion line.^[4] We speculate that the miniplates may have caused the irritation of the deep division of the supraorbital nerve and recommend not to place the miniplates above the temporal fusion line when fixating the bone flaps postcraniotomy.

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Conflicts of interest

There are no conflicts of interest.

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