Frontal sinus fracture treatment

- Contemporary Management of Frontal Sinus Fractures
- New Surgical Devices for Closed Reduction of Frontal Sinus Bone Fracture
- Biomechanical evaluation of zygomatic-orbital-maxillary complex fractures following internal fixation
- Possible complications of frontal sinus fractures after conservative or surgical treatment: retrospective study
- Spontaneous Resolution of an Aggressive Direct Carotid Cavernous Fistula Following Partial Transvenous Embolization Treatment: A Case Report and Review of Literatures
- Trauma of the midface : Symptoms, diagnostics and treatment
- Severe Delayed-Onset Meningitis Developed One Year After a Basilar Skull Fracture Without a Cerebrospinal Fluid Leak: A Case Report
- Complications following open treatment of frontal sinus fracture: A nationwide analysis of 1492 patients

The optimal treatment of frontal sinus fractures remains controversial. Multiple treatment options and algorithms have been proposed by multiple specialties throughout the years; however, the optimal method of frontal sinus repair has yet to be discovered.

Indications

The treatment indications for a frontal sinus fracture involve the criteria and guidelines that determine when medical intervention is necessary to address the fracture. The decision to treat a frontal sinus fracture is based on factors such as the type and severity of the fracture, the presence of symptoms, and the risk of complications. Indications for treatment may include:

Severity of the fracture: The extent and complexity of the fracture, such as whether it is a simple or compound fracture, will influence the decision to treat.

Cosmetic concerns: If the fracture results in a visible deformity or changes in facial appearance, treatment may be recommended to restore normal aesthetics.

Functional impairment: Fractures that disrupt the normal functioning of the frontal sinus, including the outflow tract, can lead to symptoms such as obstruction, recurrent sinusitis, or other sinus-related issues, which may require intervention.

Risk of infection: Compound fractures that involve open wounds may carry a higher risk of infection, necessitating prompt surgical management.

Associated injuries: Concurrent injuries, such as those affecting the brain, eyes, or other facial bones, may influence the decision to treat the frontal sinus fracture.

Symptoms: The presence of pain, swelling, nasal discharge, or other discomfort related to the fracture may be indications for treatment.

Imaging findings: Diagnostic imaging, such as CT scans, may reveal the extent and location of the fracture, helping to guide treatment decisions.

Patient's overall health: The patient's general health and ability to undergo surgical procedures will be considered when determining the course of treatment.

Treatment options for frontal sinus fractures may include observation, medical management, or surgical intervention. Surgical procedures may involve realigning and stabilizing the fractured bones, ensuring proper sinus drainage, and addressing associated injuries or complications. The specific treatment plan will be determined on a case-by-case basis, taking into consideration these indications and the individual patient's needs.

Systematic reviews

There is still no consensus about the best treatment for frontal sinus fractures (FSFs). Thus, the aims of a study were to answer the following questions: 1) what treatment of FSFs has the lowest rate of postoperative complications? 2) does sinus preservation using observation produce a lower complication rate? 3) are FSFs with nasofrontal outflow tract (NFOT) injury associated with greater complication rates following different treatment options when compared to those patients without NFOT involvement?

A systematic review and meta-analysis were performed based on PRISMA that included several databases with specific keywords, a reference search, and a manual search for suitable articles. Randomized clinical trials, controlled clinical studies, retrospective studies, and case series that estimated complication rates after different treatment options for FSFs were included. The predictor variable was treatment groups, including observation, ORIF, frontal sinus cranialization, and obliteration. The outcome variable was complication rate and the correlation between complication rate and the presence/absence of NFOT. A weighted complication rate/proportion using a random effect model, or risk ratio (RR) with a 95% confidence interval (CI), was performed to construct forest plots. Data analysis was done using a comprehensive meta-analysis.

A total of 2,911 patients with FSFs enrolled in 23 studies were included in this study. The weighted complication rate for different treatments was as follows: observation (7%), ORIF (9.4%), obliteration (10.6%), and frontal sinus cranialization (11%). Nonsurgical treatment decreased the complication rate by 2.1 times (low-quality evidence, RR = 2.1, CI: 1.13 to 3.9, P = .000) when compared to surgical treatments for FSFs. CR for fractures with NFOT was 8 % (55/619) compared to a complication rate of 5% (18/353) for fractures without NFOT with an insignificant difference (very low-quality evidence, RR = 1.7, CI: 0.75 to 4.1, P = .158).

FSFs vary in severity and treatments. The more severe fractures, the higher the complication rate, no matter how they were treated [1].

It is critical to evaluate these fractures properly and have a firm grasp on how to apply the correct surgical intervention to manage these injuries [2] [3].

Increasingly, many fractures that were previously operated on are now followed radiographically and treated endoscopically only if complications arise [4] [5] [6].

Algorythms

Management strategies remain controversial due to a lack of strong clinical evidence. Despite a paucity of strong literature, a logical treatment algorithm is presented based on the structural integrity of three anatomic parameters: anterior table, frontal sinus outflow tract, and the posterior table/dura. The literature supports a paradigm shift from open surgical management to a more conservative treatment algorithm emphasizing observation and minimally invasive endoscopic techniques. Long-term follow-up for complex frontal sinus injuries is critical [7)]

Surgery

Frontal sinus fracture surgery.

Case series

17 patients who underwent surgery for frontal sinus injury and its related complications at the Kangwon National University Hospital between July 2010 and September 2021. Among them, six underwent simple open reduction and fixation of the anterior wall, eight underwent sinus obliteration, and three underwent cranialization. Two patients who underwent sinus obliteration died due to infection-related complications. The patient who underwent cranialization reported experiencing chronic headache and expressed dissatisfaction regarding the esthetic outcomes of the forehead. Except for these three patients, the other patients achieved satisfactory esthetic and functional recovery.

Active surgical management of frontal sinus injuries is often required owing to the various complications caused by these injuries; however, several factors, including the fracture type, clinical presentation, related craniomaxillofacial injury, and medical history, should be considered while formulating the treatment plan. Surgical treatment through the opening of the frontal sinus should be actively considered in patients with severely damaged posterior wall fractures and those at risk of developing infection [8)].

1)
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