



ORIGINAL ARTICLE

Frontal sinus outflow tract evaluation by sagittal computed tomography in frontal sinus fracture

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Abstract The status of the frontal sinus outflow tract is important in the management of frontal sinus fractures. Anatomic and mucosal obstruction of the FSOT leads to mucociliary stasis with consequent infectious complications. This has been evaluated by routine CT scan.

Objectives: The aim of this study was to determine the ability of MPR mainly the sagittal CT images assessing the patency of FSOT in frontal sinus fractures.

Patients and methods: A prospective study was carried out from December 2008 to May 2012 on 19 patients with frontal sinus fractures. Reformatted sagittal views were done besides the routine axial, coronal CT scan views as part of facial trauma workup. These views were assessed to determine the status of the nasofrontal ducts (NFD) and compared with the operative findings.

Results: The patency of FSOT by sagittal CT reformatted images was the same as that of the operative finding in all cases (specificity and PPV were 100%) even in patients in whom FSOT in the axial and/or coronal views were doubtful.

Conclusion: Sagittal reformatted CT images are helpful in evaluating FSOT in frontal sinus fractures due to their ability to evaluate the frontal sinus in anteroposterior and superoinferior dimensions, thus aiding the surgical approach.

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1. Introduction

The frontal sinus is the only paranasal sinus that is absent at birth (1) and begins to form at the age of two years reaching adult size at the age of 15 years. The size of the sinus reaches 30 mm tall, 25 mm wide and 19 mm deep with a total volume of 10 cm (2). The frontal sinus drainage path is made of three different regions and is usually shaped like an hourglass. The upper portion of the hourglass is the frontal

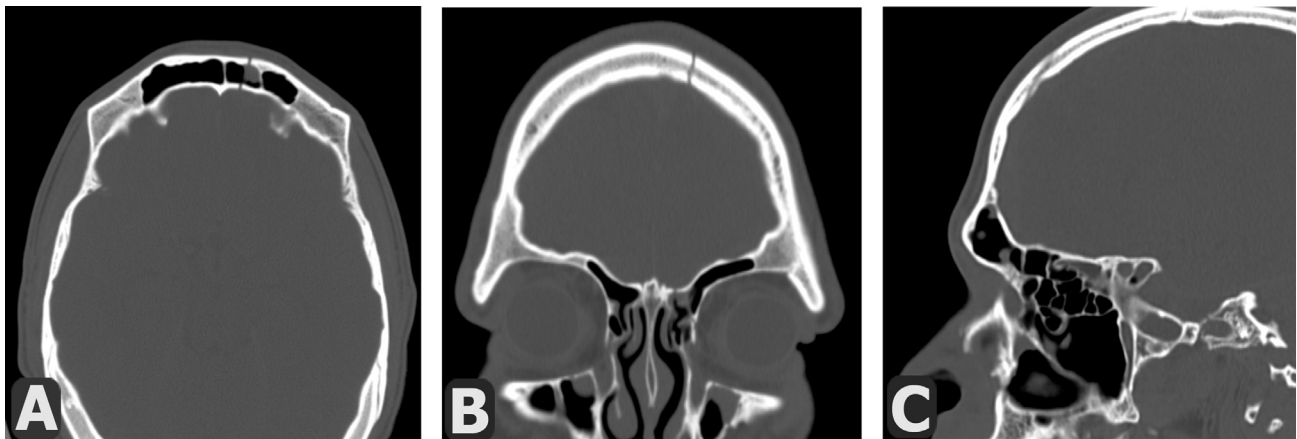


Fig. 1

sinus itself, while its narrowest portion corresponds to its ostium. The lower portion is formed by the frontal recess or the nasofrontal duct (NFD). The ostia of the sinus are present on the inferior posterior portion of the sinus medially, that are 3–4 mm in diameter and is the only drainage spot for the sinuses. Each drain into its respective infundibulum to the ethmoid sinuses. Only 15% of the populations actually have a true duct, the rest, 85% have a foramen (2–4).

The inferior portion of the frontal sinus (funnel-shaped and commonly referred to as the frontal infundibulum), the frontal ostium, and the frontal recess make up the frontal sinus outflow tract (FSOT) (4).

Frontal sinus fracture is about 5–12% of facial fractures. The treatment of frontal sinus fractures is of paramount importance because of the anatomical relationship of the sinus with the brain and the delicate periorbital region. The treatment of frontal sinus fractures remains controversial. The patency of FSOT is the most important component in the decision-making process for the management of frontal sinus fracture (1,5). Fig. 1.

Computed tomography (CT) data play a pivotal role in the classification and surgical management of frontal sinus injuries. Traditionally, evaluation of frontal sinus fracture and the status of FSOT required an axial and coronal CT scan of the paranasal sinuses. However, as the normal frontal sinus duct typically courses in a superoinferior direction which could

not be achieved solely with coronal images (6,7), the sagittal view may be the best view for evaluation of the FSOT. With the advent of multidetector CT scanning, high-quality sagittal images have become increasingly available. However, the utility of these images in the assessment of FSOT patency has not yet been established (6).

The aim of this study was to determine the efficacy of reformatted sagittal CT views to assess the patency of FSOT in frontal sinus fractures.

2. Patients and methods

Nineteen patients with radiographic evidence of frontal bone fracture caused by motor vehicle accidents, falls, and blunt trauma, were included in this study during the period from December 2008 to May 2012. They attended emergency unit then referred to the Otorhinolaryngology department after neurosurgical evaluation and stability (no CSF leak at time of surgical interference).

Non displaced anterior and/or posterior table fractures that did not require surgery and treated conservatively were excluded from the study and only fractures needed surgical intervention were included for operative confirmation of FSOT patency Fig. 2.

Informed written consent was signed by all patients.

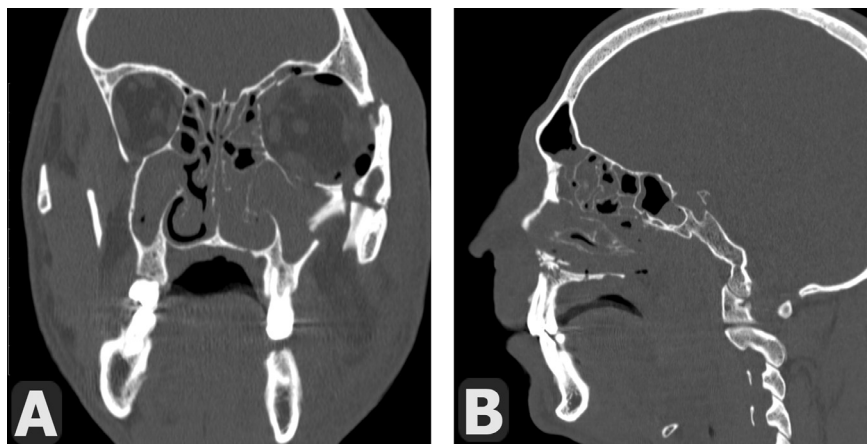


Fig. 2 (A) Coronal, (B) sagittal views showing LT frontal sinus fracture of the anterior table with obstructed FSOT.

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