

**CT analysis of structural buttresses in the traumatized nose – A basis for decision making for early open rhinoplasty and biomechanical study of nasal structural support**

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Nasal deformity in 50% of patients and residual internal septal deviation in 42% of patients. Up to 50% of patients with nasal fractures require technically difficult secondary surgery for these two complications. As the septum is the key support structure in the nose and nasal bones tend to unite in the direction of the septum, correction of septal alignment is vital for reducing the occurrence of complications. To date, few reported studies have advocated early open surgery to realign and reconstruct the fractured and deviated nasal septum.

Hypothesis: We propose that there are 5 support buttresses in the complex osteocartilaginous architecture of the nose. A novel computer software program will be designed to identify and verify these proposed 5 support buttresses:

1- The membranous septum; 2- The Right nasal bone; 3- The Left nasal bone; 4- The perpendicular plate of the ethmoid;

5- The vomer, vomerine groove and anterior nasal spine. Furthermore, we propose that the membranous septal fractures and dislocation are the principal events with secondary fracture and displacement of the adjacent fractures leading to change in external nasal morphology and internal airway obstruction.

We aim to impact current clinical practice and improve the treatment outcomes by utilizing CT scans to analyze

1. Normal architecture of the nasal buttresses;
2. Fracture patterns of the buttresses associated with septal deviation and changes to the external nasal morphology;
3. Weakest buttress as seen by the highest frequency of fracture;
4. Strongest buttress as seen by the lowest frequent of fracture;
5. Assessment of nasal patency due to the changes in nasal morphology before and after the surgical correction.

The software program created to validate the data above will be used on future acute nasal fractures to quantify the risks for subsequent changes to external nasal morphology and septal deviation. This will allow us to have clearer treatment guidelines for open surgical correction. The proposed study also aims to objectively assess the nasal flow pattern, flow speed, pressure and wall shear stress before and after surgical correction of nose fracture. The outcome will assist in the identification and establishment of critical factors during surgery that may affect nasal patency. To date, there are few reported studies on the assessment of nasal patency.