

The Use of the Intra op CT on the Management of Orbital Reconstruction

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Disclosure Statement

The following potential conflict of interest relationships are germane to my presentation.

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NA

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Objectives

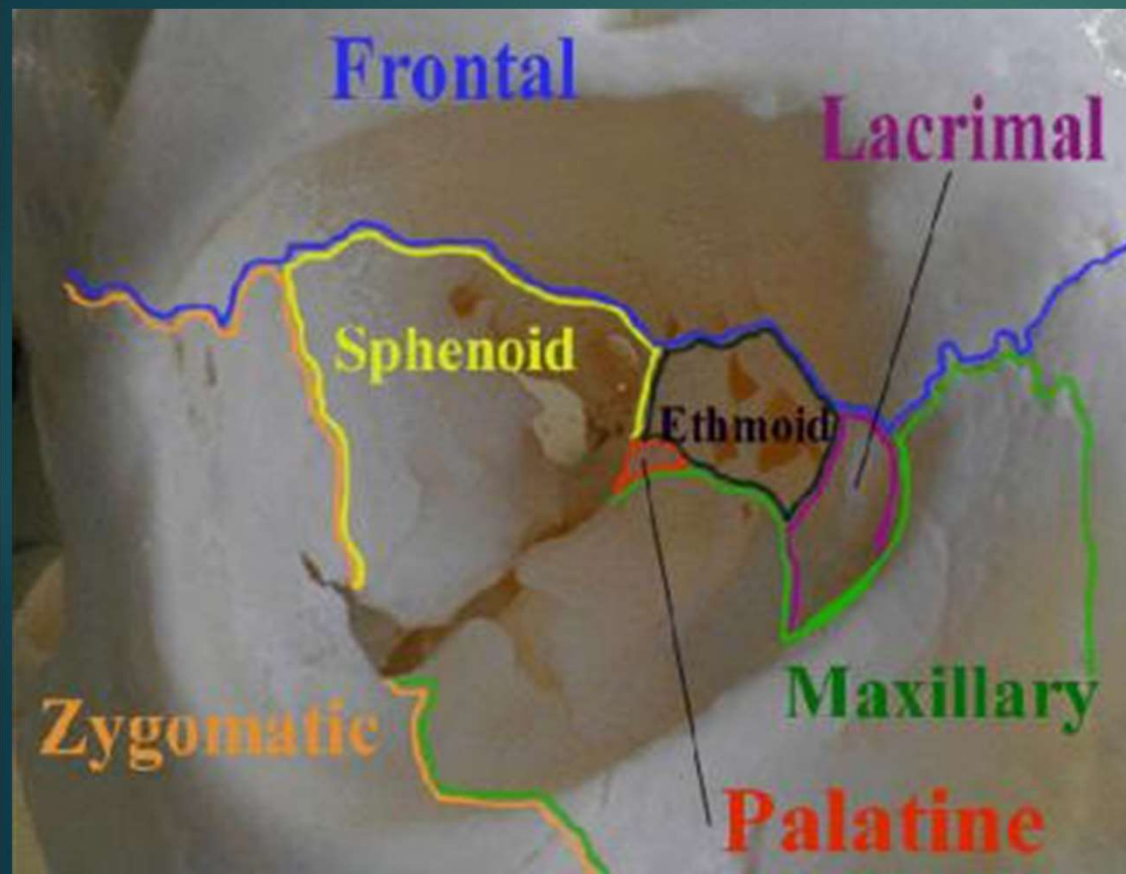
- ▶ Overview of orbital trauma and reconstruction
- ▶ Utilization of intra op CT scan in maxillofacial trauma
- ▶ Indication for intra op CT scan in orbital reconstruction

Introduction

- ▶ Fractures inside and around the orbit are common
- ▶ They vary from isolated orbital wall fractures to complex craniofacial injuries involving the orbital rims and walls

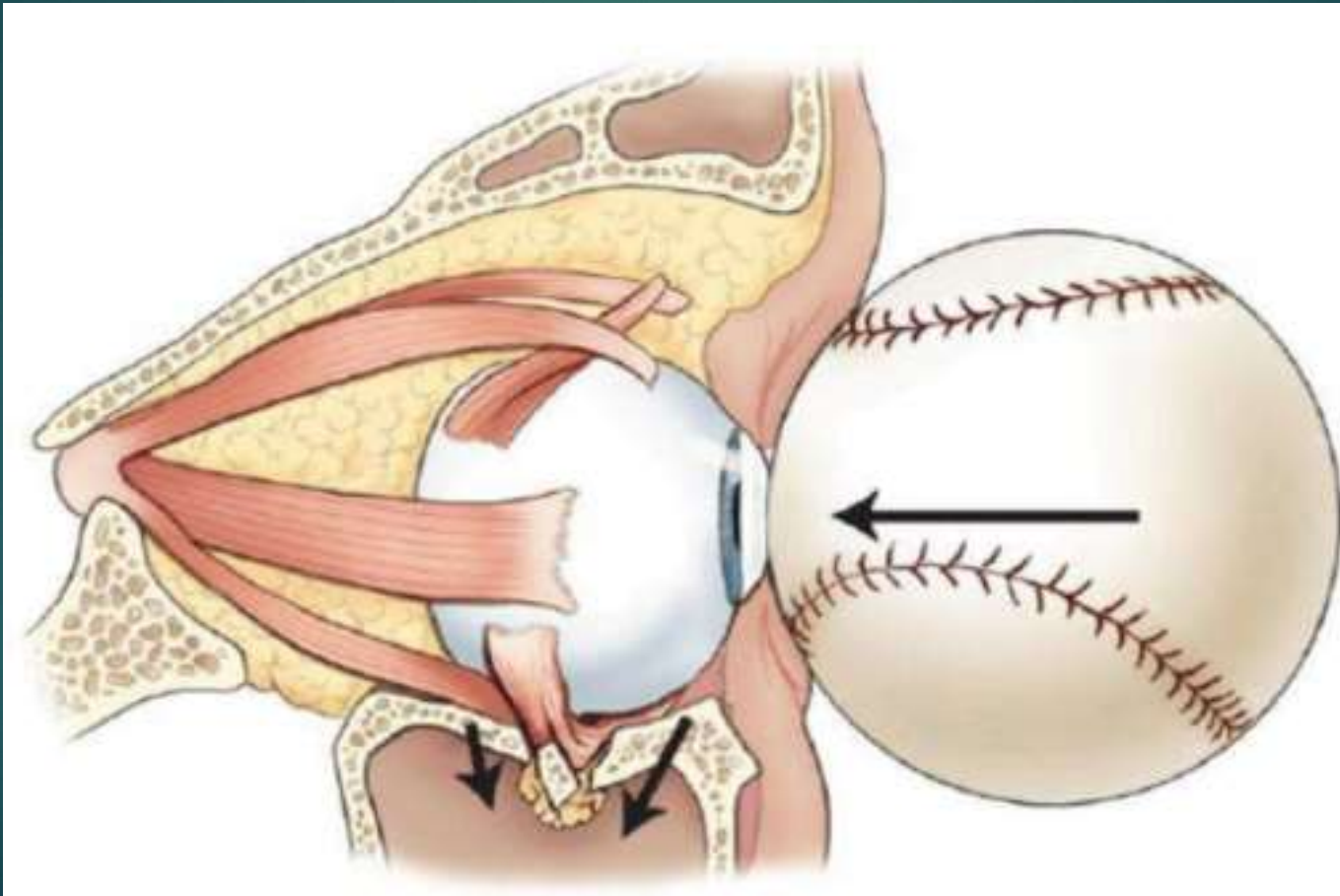


Bony Anatomy



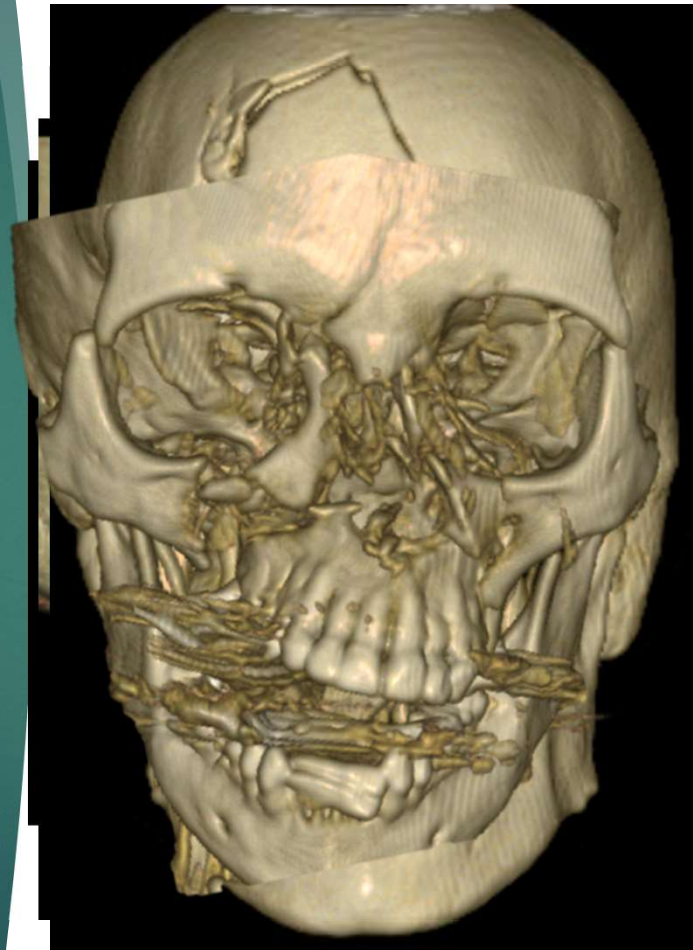
- ▶ A floor
- ▶ Medial wall
- ▶ Lateral wall
- ▶ Roof
- ▶ Apex
- ▶ Rims

Mechanism of Injury



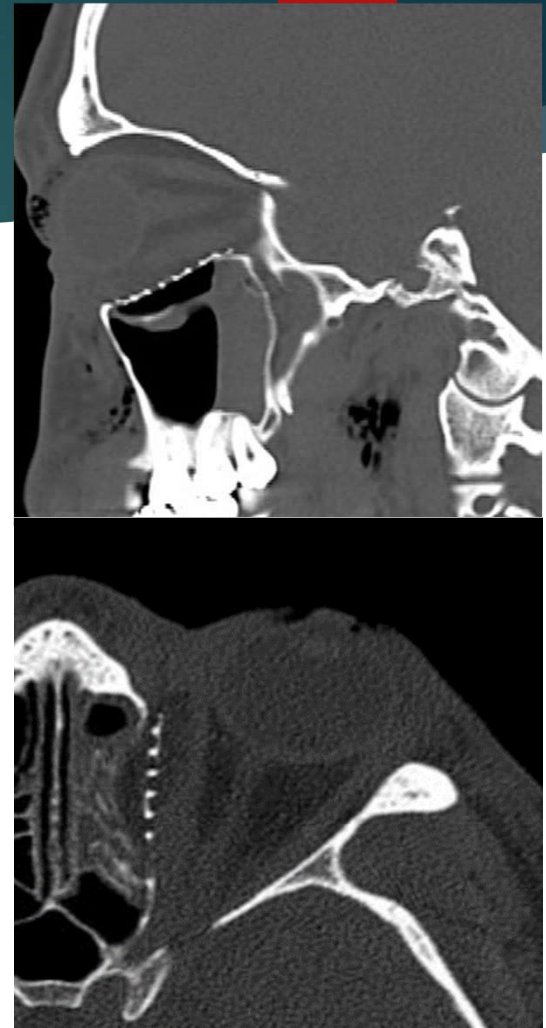
Incidence

- ▶ Up to 40 % of facial injuries includes the orbit
- ▶ Isolated orbital fractures
- ▶ ZMC
- ▶ NOE
- ▶ Lefort II
- ▶ Lefort III



Reconstruction

- ▶ Proper reconstruction of the orbit anatomy
- ▶ Correct functional disability
- ▶ Don't make it worse



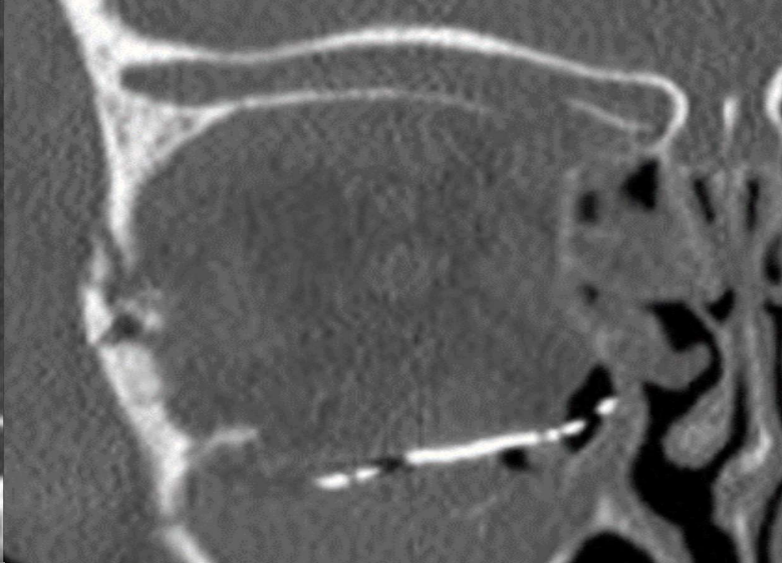
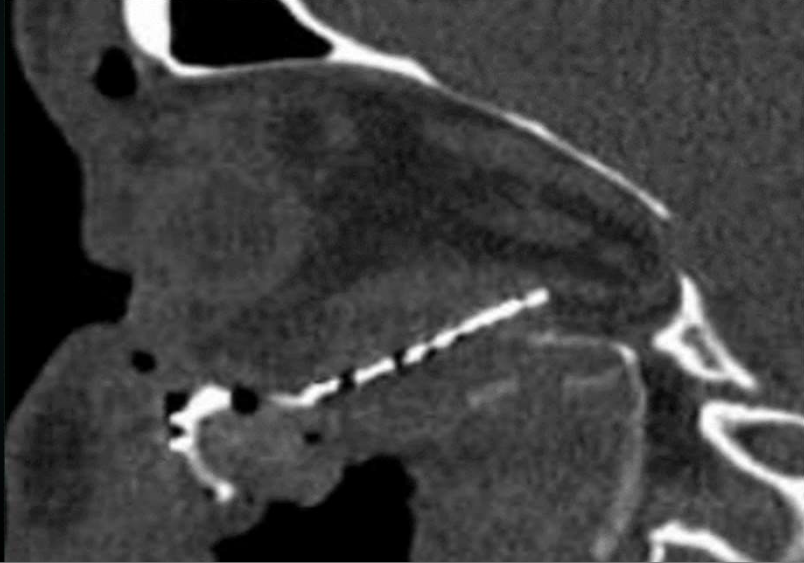
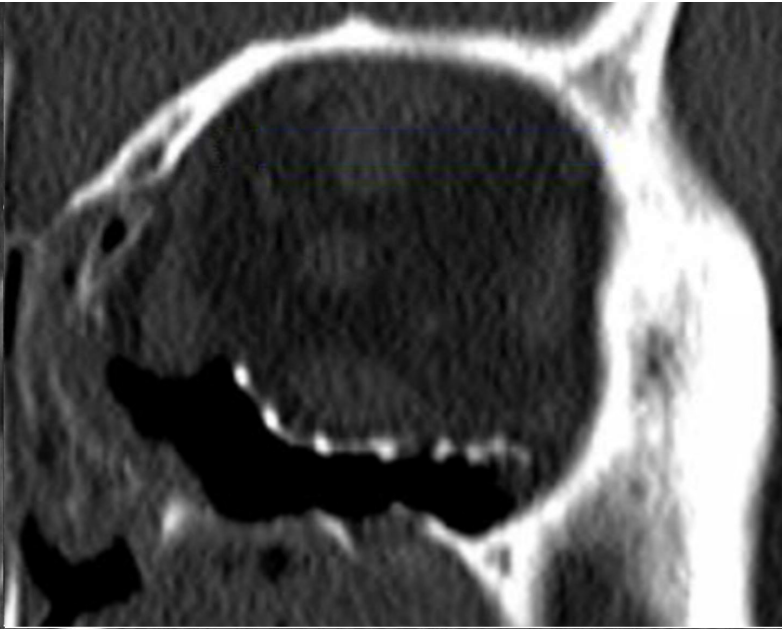
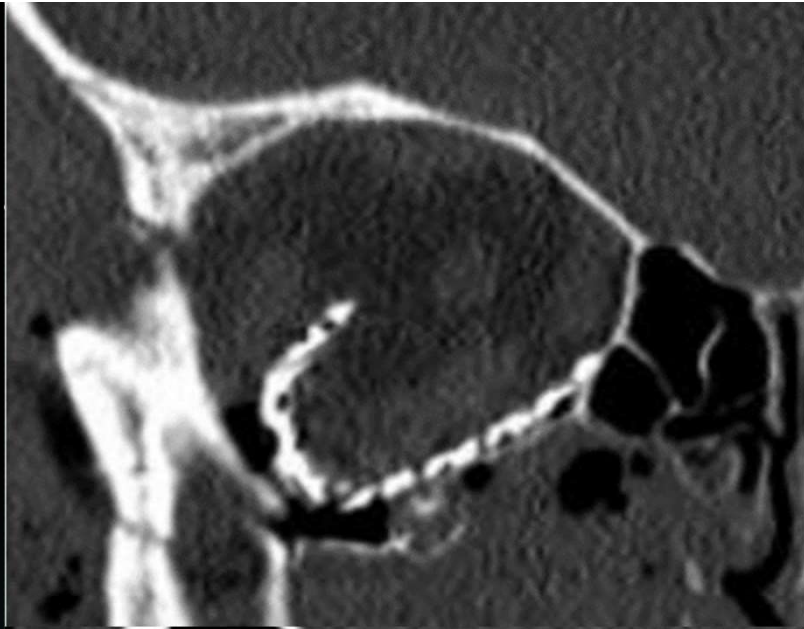


Post operative complications



Why the use of intra-
operative imaging ?





Post operative complications associated with orbital wall reconstructions

▶ *Globe position*

- ▶ 1- Inadequate reconstruction
- ▶ 2- Mal position

▶ *Entrapment*

- ▶ 1- Persistent entrapment
- ▶ 2- Iatrogenic entrapment

Discussion

- ▶ Out of 73 implants, 23% of the orbital implants were poorly inserted
- ▶ Out of the 23%, **12 patients (17%)** had revision surgery due to clinical symptoms



Orbital Implant Revision Surgery Indication?



Wagner, MD, † Chantal Michel, §
Wagner, MD, DMD ¶

Standard in maxillofacial surgery, except to estimate the frequency of implant

performed in a level I trauma center at the time of positioning, a qualitative analysis of volumetric measurements of the orbital secondary revision procedures were

Emergency patients (73 implants) were treated with titanium mesh (48 male patients; mean age 38%) by the qualitative analysis. The revision was needed in 12 patients without clinical symptoms.

Revision treatment with a titanium mesh after failure of the implant is the main reason for revision. Control should be obtained routinely. Revision should be avoided.

Utilization of intra op CT scan in maxillofacial trauma

- ▶ Intraoperative CT imaging is an effective tool for evaluating ZMC fracture reduction
- ▶ It avoids additional surgeries and eliminates the need for postoperative imaging

CRANIOMAXILLOFACIAL TRAUMA

Intraoperative Imaging With a 3D C-Arm System After Zygomatico-Orbital Complex Fracture Reduction

Frank Wilde, MD, DMD, Kai Lorenz, MD, PhD,† Ann-Katrin Ebner, DMD,‡
Oliver Krauss, MD,§ Frank Mascha, MD, DMD,|| and
Alexander Schramm, MD, DMD, PhD¶*

Purpose: During the repair of zygomatico-orbital complex (ZMC) fractures, the lateral orbital wall and/or the orbital floor is often reduced by merely reducing the zygoma. Intraoperative 3D imaging can help surgeons decide whether the orbit must be reconstructed as well. The purpose of this study was therefore to assess the usefulness of intraoperative 3D C-arm imaging in evaluating the adequacy of fracture reduction.

Methods: A total of 21 patients with unilateral ZMC fractures were enrolled in this retrospective study. Four fractures were treated with a closed reduction technique. Seventeen fractures were repaired with open reduction and internal fixation of the zygomaticomaxillary buttress area. Intraoperative 3D C-arm imaging was performed in all cases. All patients underwent postoperative computed tomography and a clinical examination no earlier than 5 months after the procedure.

Results: After reduction of the ZMC fractures, intraoperative 3D scans showed inadequate repair of the orbital floor in 2 patients and inadequate repair of the lateral orbit in 1 patient. Zygoma and zygomatic arch fracture reduction had to be corrected in 1 further case. The other 17 patients did not need an additional procedure. Postoperative imaging showed that no patient required a secondary operation. No postoperative diplopia or enophthalmos developed in any patient.

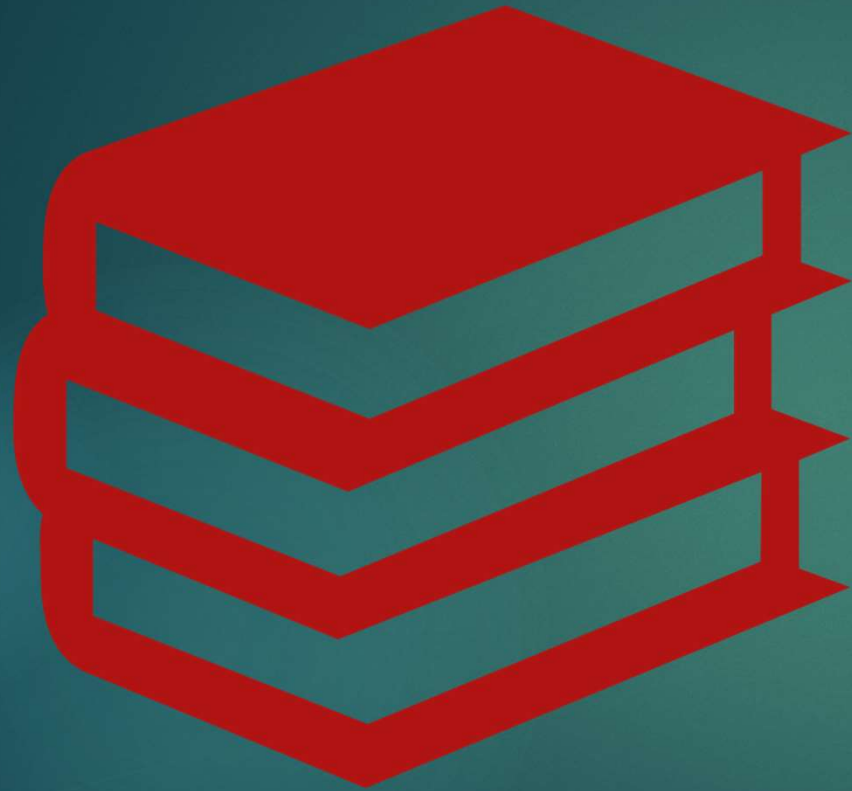
Conclusions: Intraoperative 3D C-arm imaging appears to be an effective tool for evaluating ZMC fracture reduction. It helps avoid additional procedures and thus helps reduce morbidity. In addition, there appears to be no need for postoperative imaging.

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Comparison between Facial CT and O – Arm

	Facial CT Scan	Intraoperative O-Arm
Voltage	120 Kv	150 Kv
Current	200 mA	10 mA
No of Images	50-80	50-80
Exam Duration	10-15 Mins	5-8 Mins
Planes Viewed	Axial ,Coronal ,Sagittal	Axial ,Coronal ,Sagittal
Slice Thickness	1.0- 2.5mm	0.83
Effective Dose	8 mSv*	0.73 mSv*

N.B: above 100 mSv posses health risk



The Research

The use of Intra op CT scan in orbital reconstructions

1

Does the use of Intraoperative CT scan minimize the complication after orbital reconstruction?

2

We try to answer this question by having 10 patient with orbital fractures repair using the O arm and 10 patients not using the O-Arm

3

In the first group our aim was to asses the proper position of the implant from the initial placement and **if we needed to change it**

Material and Methods

Group 1 (Intraop CT Scan) 10 Patients	Group 2 (Traditional) 10 patients
One Wall (Orbital Floor Only) <i>Number of Subjects: 8</i>	One Wall (Orbital Floor Only) <i>Number of Subjects:6</i>
Two Walls <i>Number of Subjects 2</i>	Two Walls <i>Number of Subjects: 4</i>

A photograph of an operating room. In the center, a large, circular C-arm X-ray machine is positioned around a patient lying on a table. The patient is covered with a blue sterile drape. To the left, there are various medical monitors and equipment. A black office chair is visible in the background. The room is dimly lit, with a red rectangular shape in the upper right corner. The text "Technical Steps to obtain Intraoperative imaging" is overlaid in white on the left side of the image.

Technical Steps to obtain Intraoperative imaging









PERIOPERATIVE
Case: _____
Patient Name: _____
Date of Birth: _____
PROCEDURE: _____
Patient Position: _____
SURGICAL: _____
ANESTHESIA: _____
Wet Towel Verification: _____
Surgical Site Marking: _____
Preparation of Operating Room: _____



Results

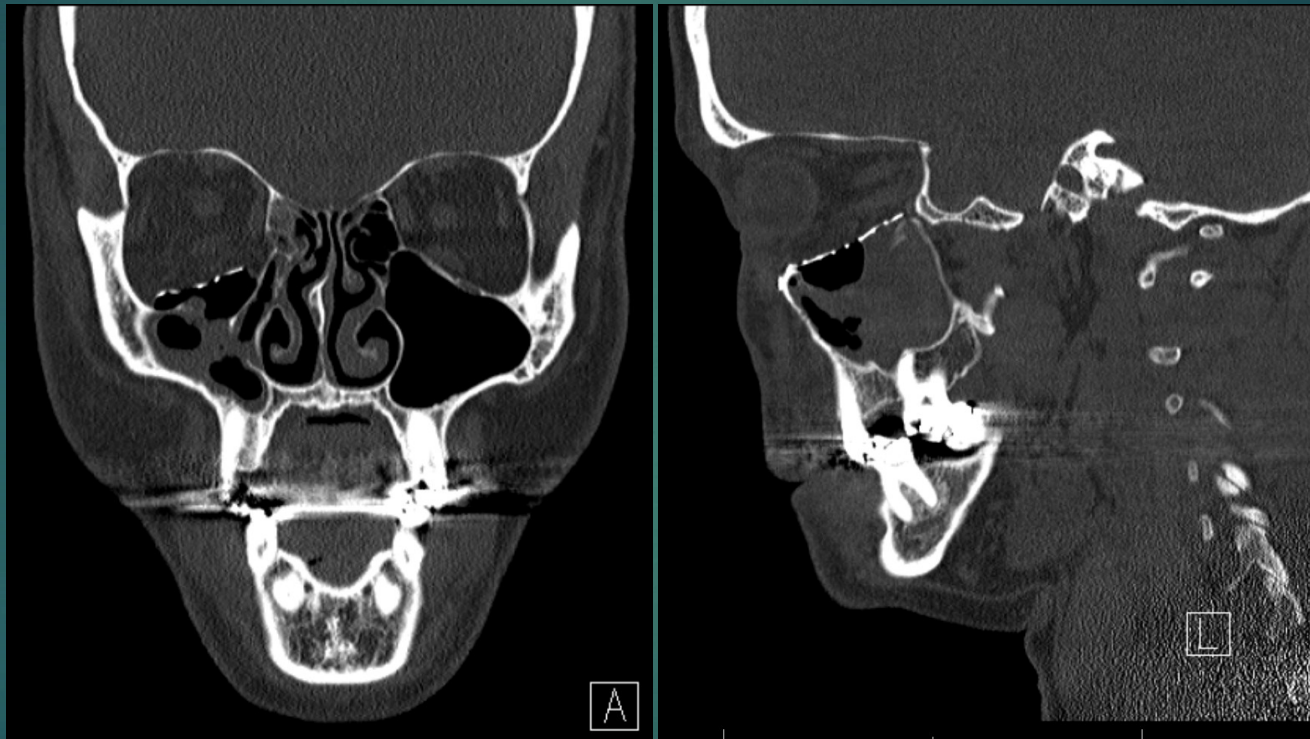
Group 1 (The use of Intraop O-Arm):

All subjects had a well positioned implants post operatively

In the One wall Group, All implants were positioned correctly from the first attempt

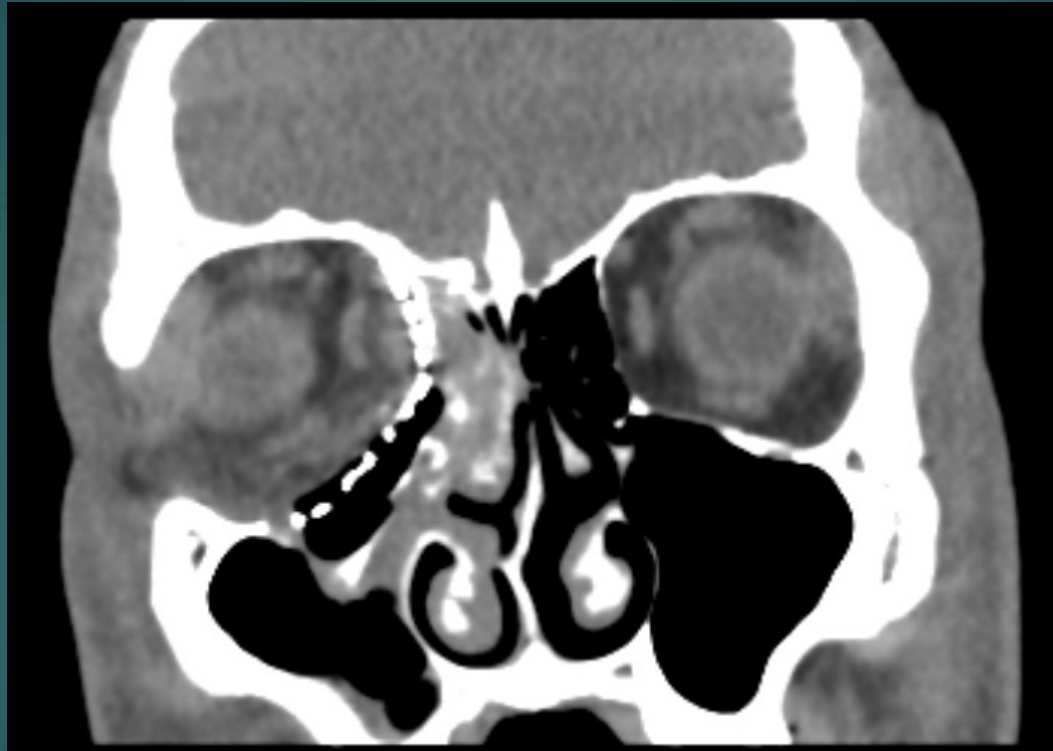
However, in the Two walls group one implants was positioned incorrectly and had to be changed after the intraoperative images

Group 1: One Wall Defect



- ▶ 48 y.o male s/p MVA passenger with seatbelt

Group 1 : Two wall defect



▶ 26 y.o male assaulted

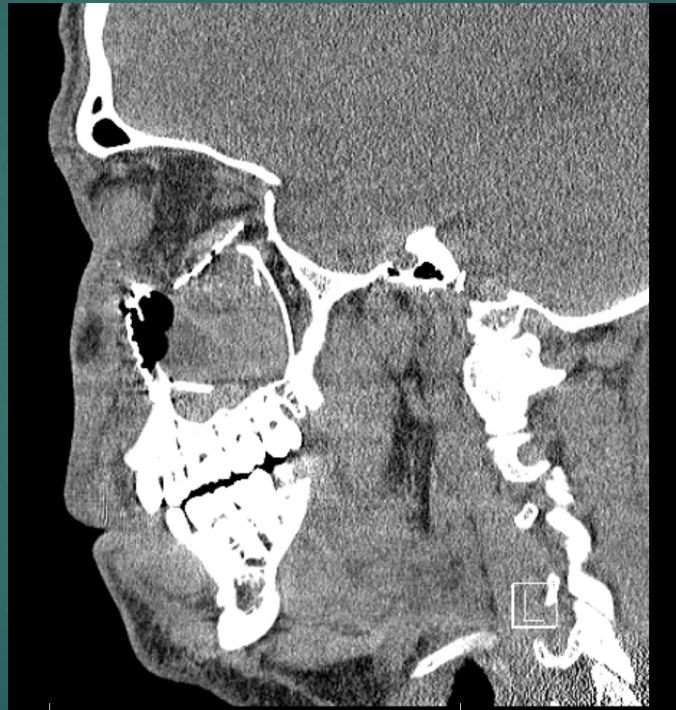
Results

Group 2 (The Traditional group):

In the One wall Group,
One implant was
positioned incorrectly
and we had to take the
patient back to
operating room

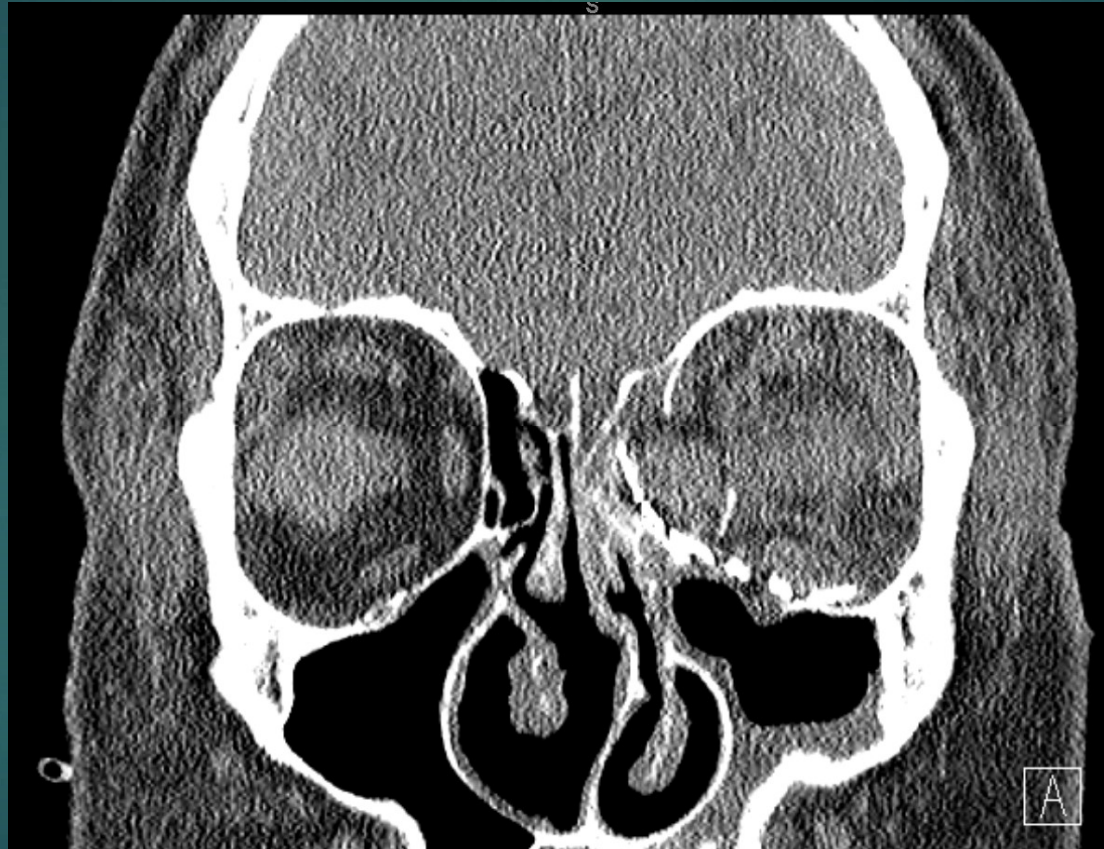
Also, in the Two walls
group, one of 4 implants
was positioned incorrectly
with evidence of muscle
incarceration resulted in
post operative diplopia

Group 2: One wall defect



- ▶ 27 y.o male punched in the face

Group 2 : Two wall defect



▶ 51 y.o male assault

Discussion

- ▶ Intra op CT is still not a standard procedure in cranio-maxillofacial trauma surgery
- ▶ It has become more popular among OMFS, particularly in mid-face fractures
- ▶ In orbital trauma it is mostly useful in multi walled complex orbital fractures
- ▶ It gives an opportunity to the surgeon to react immediately after a mal-positioned orbital implant and prevents post-operative complications

Conclusion

- ▶ Intraoperative CT scan is an excellent adjunctive tool that will help OMFS surgeons to reconstruct orbit with more confidence
- ▶ The use of intra op CT scan will eliminate the risk of a mal position implant and taken the patient back to the OR





Thank you

Gracias