

# Clinical Application of Different Surgical Navigation Systems in Complex Craniomaxillofacial Surgery: the Utilization of Multi-Surface Three-Dimensional Images and a Two-Plane Reference System

Tom J. Liu, M.D.

Hsiung-Fei Chien, M.D., Ph.D.

Thomas Mon-Hsian Hsieh, M.D., Ph.D.

Division of Plastic Surgery  
Department of Surgery  
National Taiwan University Hospital

# Disclosure of Relevant Financial Interests

- Nothing to disclose

## Inform Consent of Photo Release

- All patients in this presentation granted us permission to use their images for the academic purpose

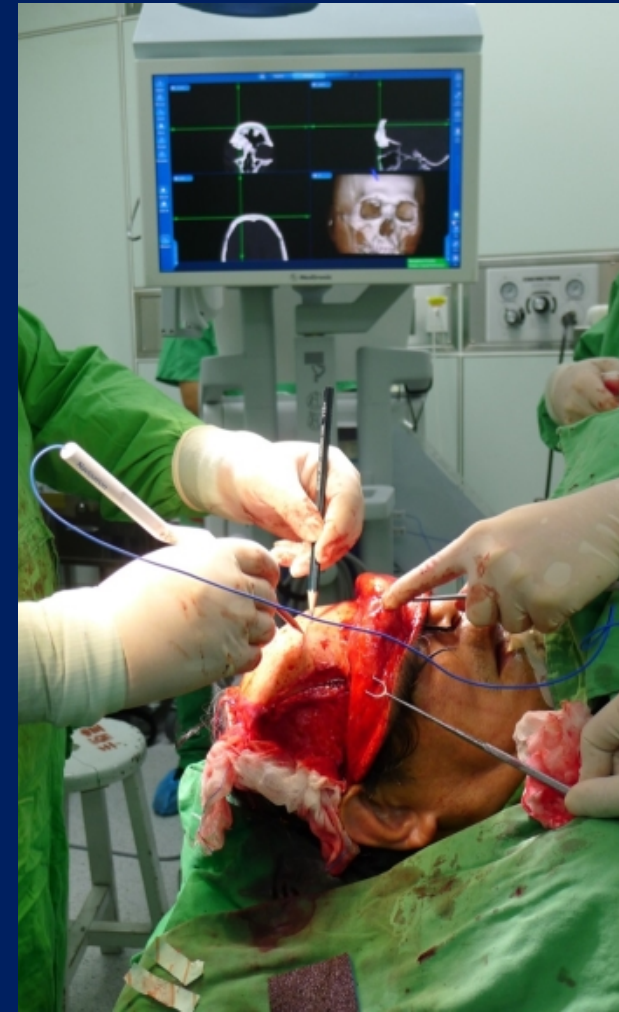
# Objective of The Study

- Demonstrate the clinical application of **intraoperative 3-D navigation** in **complex craniomaxillofacial surgery**
- Introduce the application of **multi-surface 3-D images** and a **simple two-plane reference system**
- Compare advantages and disadvantages of **different navigation systems**
- Propose an **algorithm** of navigation in craniomaxillofacial surgery

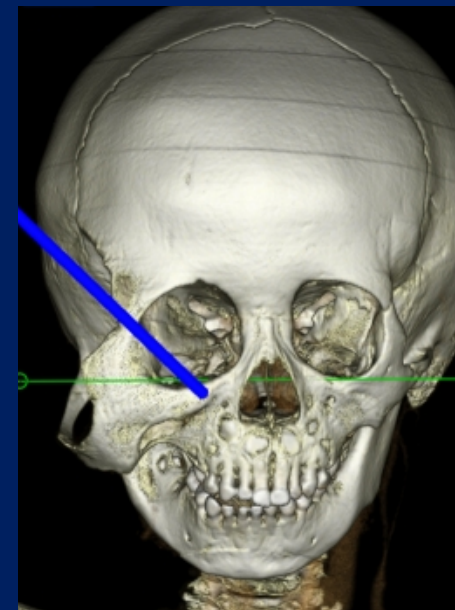
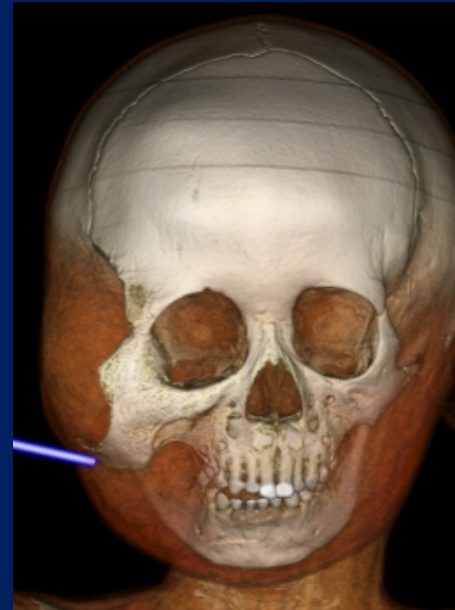
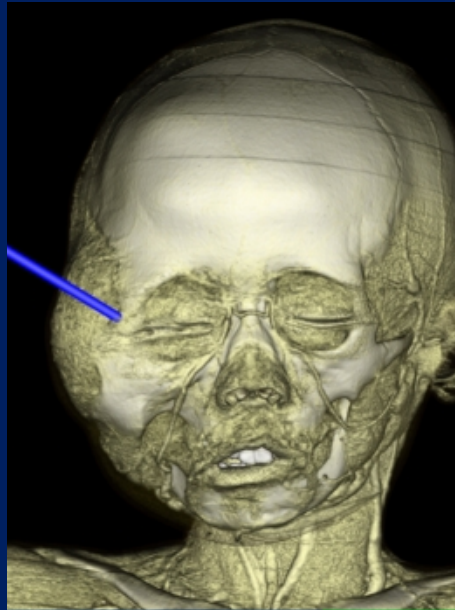
# Materials and Methods

- 15 patients from November of 2010 to July of 2014
- Complex craniomaxillofacial surgery with assistance by three different navigation systems
- Utilization of **multi-surface 3-D images** in all cases
- Utilization of **two-plane reference system** in 10 cases to get symmetric outcome

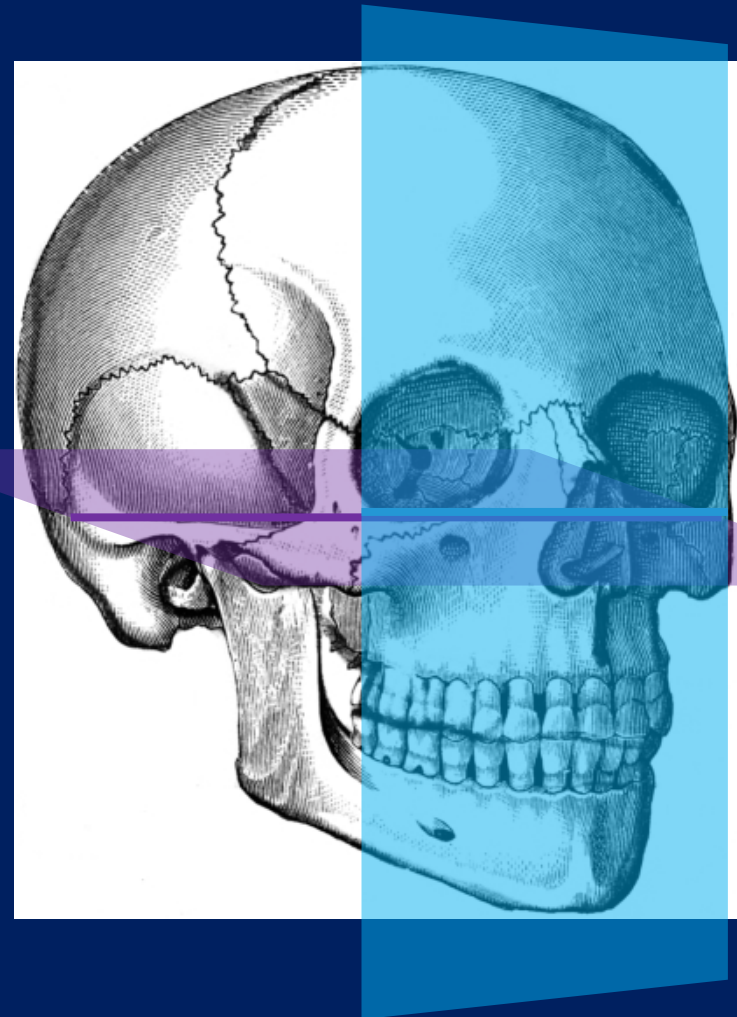
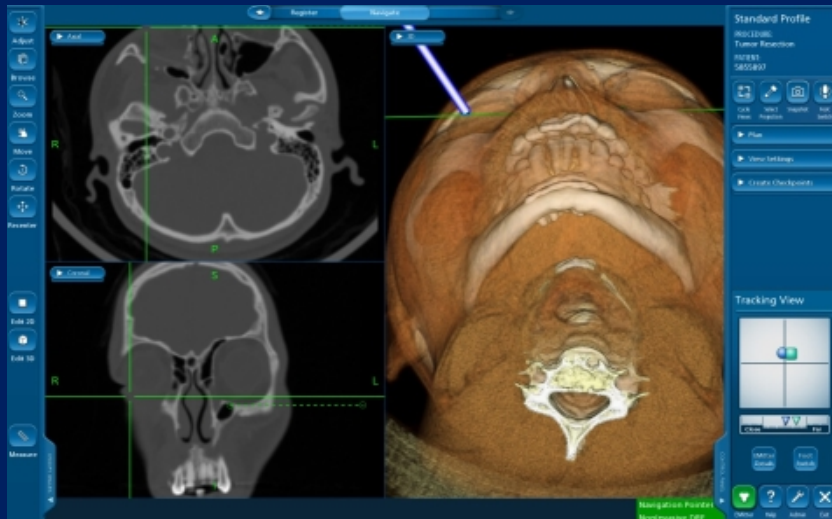
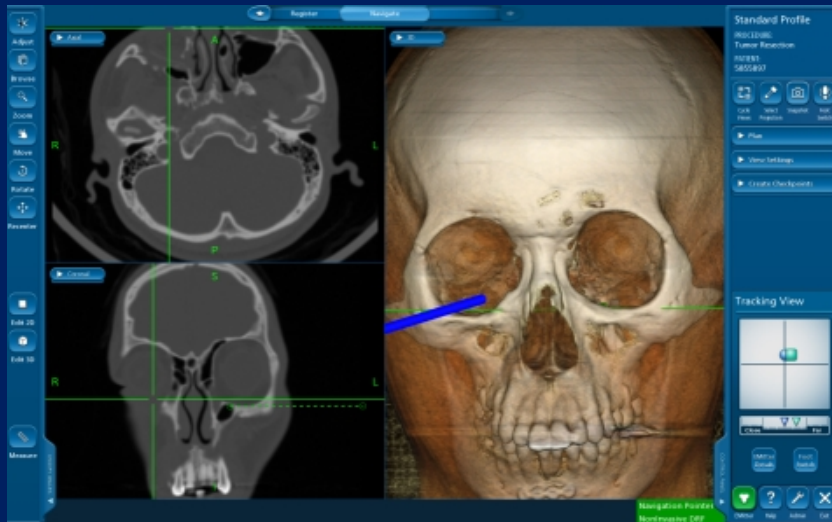
# Surgical Navigation



# Multi-surface 3D image guidance



# 2-plane reference system

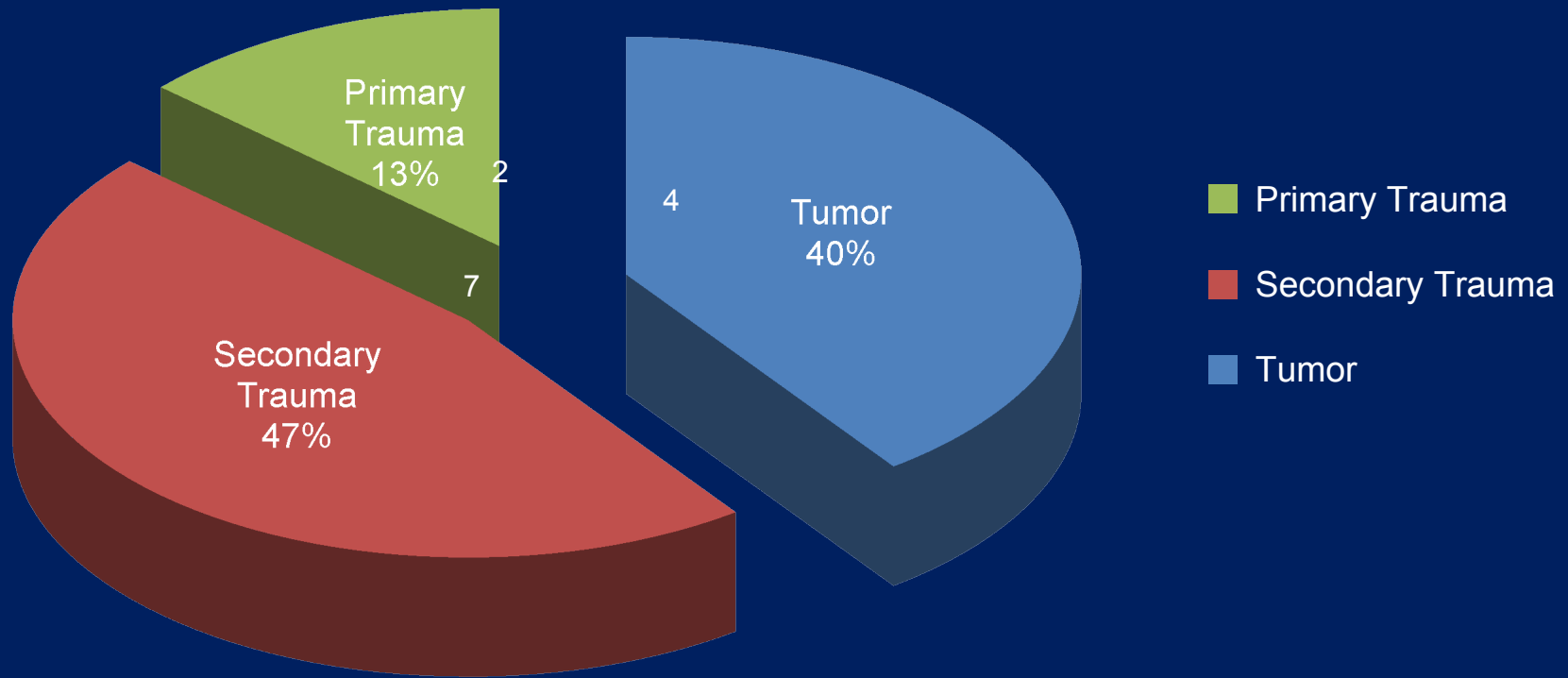


# Results and Conclusions

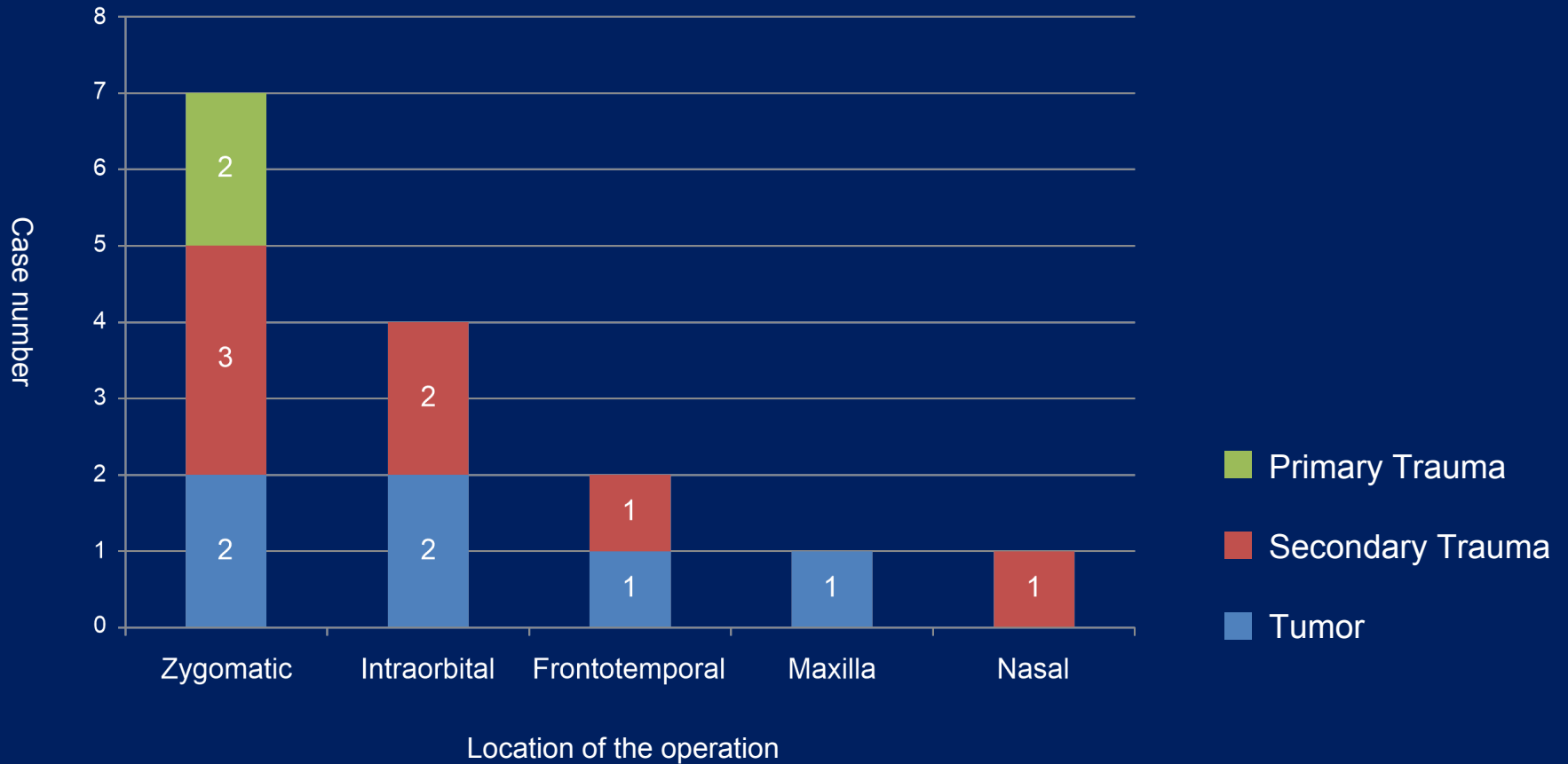
- 3 cases with infrared-based navigation
- 12 cases with electromagnetic technology
- Mean follow-up time: 16.7 months
- Most of the patients have satisfactory results



# Patients Classification by Etiology



# Patients Classification by Location



Preoperation



Postoperation



Preoperation



Postoperation



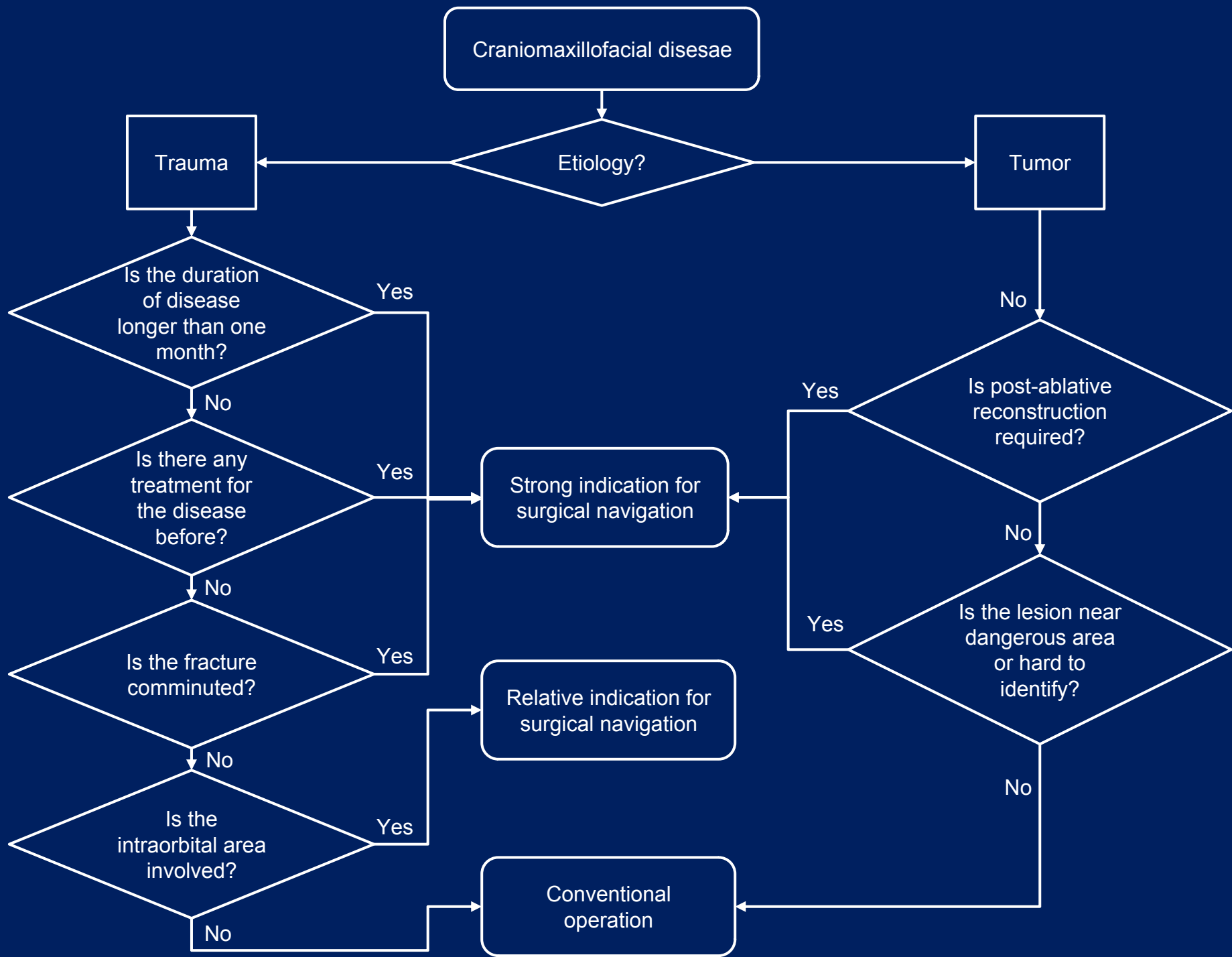
# The advantages and disadvantages of electromagnetic navigation system

## Advantages

- Smaller and more portable emitter
- No problem of line of sight
- Tract true position at deep anatomical structures
- Very small reference and sensors

## Disadvantages

- Large ferrous and conductive metals may interfere with the electromagnetic field
- Limited distance between electromagnetic emitter and surgical field



Thank you for your attention!