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# Identifying Risk Factors for Readmission of Trauma Patients Treated with Middle Meningeal Artery Embolization

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## Introduction

- Middle meningeal artery (MMA) embolization is:
  - A minimally invasive procedure used to prevent rebleeding of subdural hematomas (SDH).
  - Embolizes the middle meningeal artery which is the primary blood supply for SDH.
- Patients diagnosed with SDHs have long term mortality rates of about 30%.<sup>1</sup>
  - This is associated with a 10-20% recurrence of SDH after a neurosurgery procedure (not including MMA) that aimed to remove the SDH.<sup>1</sup>
- MMA has shown to reduce recurrence of SDH, indicating the procedure to be a possible aid in reducing the risks of SDH related traumas.<sup>1</sup>

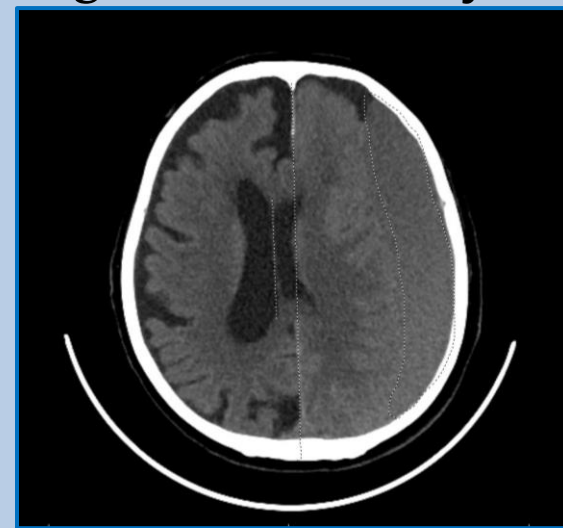


Figure 1. Image of large left SDH resulting in compression and midline shift.

## Objectives

- Create a database of patients treated with MMAs.
- Identify risk factors among patients for readmission with recurring SDH.

## Methods

**Gathering Data**  
Combined institutional data from trauma registry and Interventional Radiology registry.

**REDCap Input**  
Retrospective chart review of identified MMA patients through reading chart notes.

**Analysis**  
Compared data of not readmitted versus readmitted patients and determined significant variables.

## Results

Table 1. Comparison of Life and Injury Factors Among Readmitted and Not Readmitted MMA Patients.

Variable	Readmitted	Not Readmitted	Significance
Number of Patients	44	87	-
Percentage with MMA on First Admission	59.09%	100%	<0.001
Gender Ratio (M/F)	5.29	1.58	<0.001
AVG Age	73.81	73.95	0.909
AVG BMI	27.07	27.24	0.933
AVG Modified Frailty Index-11 (MFI-11)	0.15	0.14	0.727
AVG Charleston Comorbidity Index (CCI)	4.18	4.32	0.198
AVG Glasgow Coma Scale (GCS)	14.57	14.36	0.329
AVG Injury Severity Score (ISS)	12.03	13.66	0.971
AVG Days Before MMA	35.07	21.8	0.129
AVG Days in ICU	3.91	3.94	0.362
AVG Days of Hospital Stay	12.16	22.89	0.230
Number Receiving Neurosurgery	24	30	0.057
AVG Days Before Neurosurgery	22.5	4.43	<0.001

- Home
- In-patient rehabilitation
- Home with home health
- Hospice
- Skilled nursing facility (SNF)
- Long-term acute care hospital (LTACH)
- Died in the hospital
- Transferred to another hospital

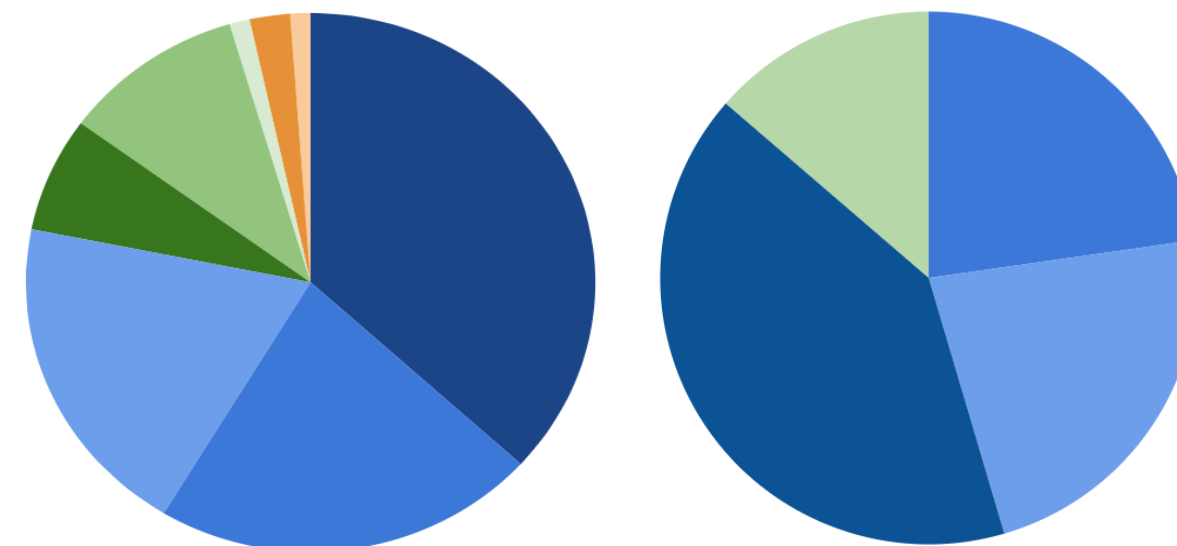


Figure 2. Initial Disposition of Not Readmitted (left) and Readmitted (right) Patients

Variable	Significance
Age	0.002
Gender	0.096
GCS	<0.001
Neurosurgery Occurrence	0.094
Days Before Neurosurgery	0.158
Days Before MMA	0.258
Days in ICU	<0.001
Intubation	0.010
Hospital Length	0.667
Abbreviated Injury Score (AIS) Neck	0.002
AIS Thorax	0.006

Table 2. Factors Affecting Discharge Dispositions of Not Readmitted Patients



Scan For More Data

## Conclusions

- Having an MMA on the first admission to hospital may significantly decrease readmission rates.
- Significantly more males were readmitted for later SDH.
- Timing of neurosurgery procedures in conjunction with MMA has a significant effect on representation.
- No determinants for different dispositions in those readmitted, while age, initial GCS score, ICU time, intubation, and AIS for neck and thorax had showed to be significant in different dispositions of not readmitted patients.
  - Patients have many needs that need to be analyzed so the right choices for their discharge and health are made.

## Future Directions

- Investigate the different outcomes of elective versus emergency MMA procedures.
- Identify the success of MMA procedures long term.
- Determine the effect of initial SDH volume on recurrence and outcomes.

## References

1. Fiorella D, Arthur AS. Middle meningeal artery embolization for the management of chronic subdural hematoma. J Neurointerv Surg. 2019 Sep;11(9):912-915. doi: 10.1136/neurintsurg-2019-014730. Epub 2019 Feb 23. PMID: 30798265.