ICP, BMI, surgical repair and CSF diversion in patients presenting with spontaneous CSF otorrhea

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Presenter Disclosure Information

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The following relationships exist related to this presentation:

No relationships to disclose

Introduction: Etiology of CSF Otorrhea

- Head injury and temporal bone fracture
- Iatrogenic injury
- Erosive changes from chronic otomastoiditis or neoplastic process
- Spontaneous or idiopathic CSF otorrhea

Spontaneous CSF Otorrhea- pathophysiology

- Not well understood
  - Arachnoid granulations
  - Congenital defects
  - Chronic intracranial hypertension

Introduction

- Two distinct populations are primarily affected with spontaneous CSF otorrhea, young children and middle aged adults

- Adults with spontaneous CSF otorrhea tend to present with complaints of aural fullness or hearing loss

Introduction

- Chronic intracranial hypertension, such as that seen with benign or idiopathic intracranial hypertension (IIH), is known to predispose to CSF leaks, including CSF otorrhea
- This syndrome is particularly prominent in
  - obese
  - middle aged women
  - associated with headache, pulsatile tinnitus and visual changes

Introduction

- Numerous publications have reported on the association between spontaneous CSF otorrhea, obesity and increased ICP
- Surgical management entails middle fossa or transmastoid repairs of tegmen defects
- Long term management of intracranial hypertension in these patients is not well established

Objective

- To report our experience in treating patients with spontaneous CSF otorrhea
- Assess BMI and ICP, but also report on our long term management of patients found to have elevated ICP
- Specifically, in regards to the use of CSF diversion procedures such as ventriculo-peritoneal (V-P) or lumbo-peritoneal (L-P) shunts

Methods

- Institutional review board approval was obtained from the University of Pittsburgh

- A retrospective chart review was performed on patients treated for CSF otorrhea between 2004 and 2013

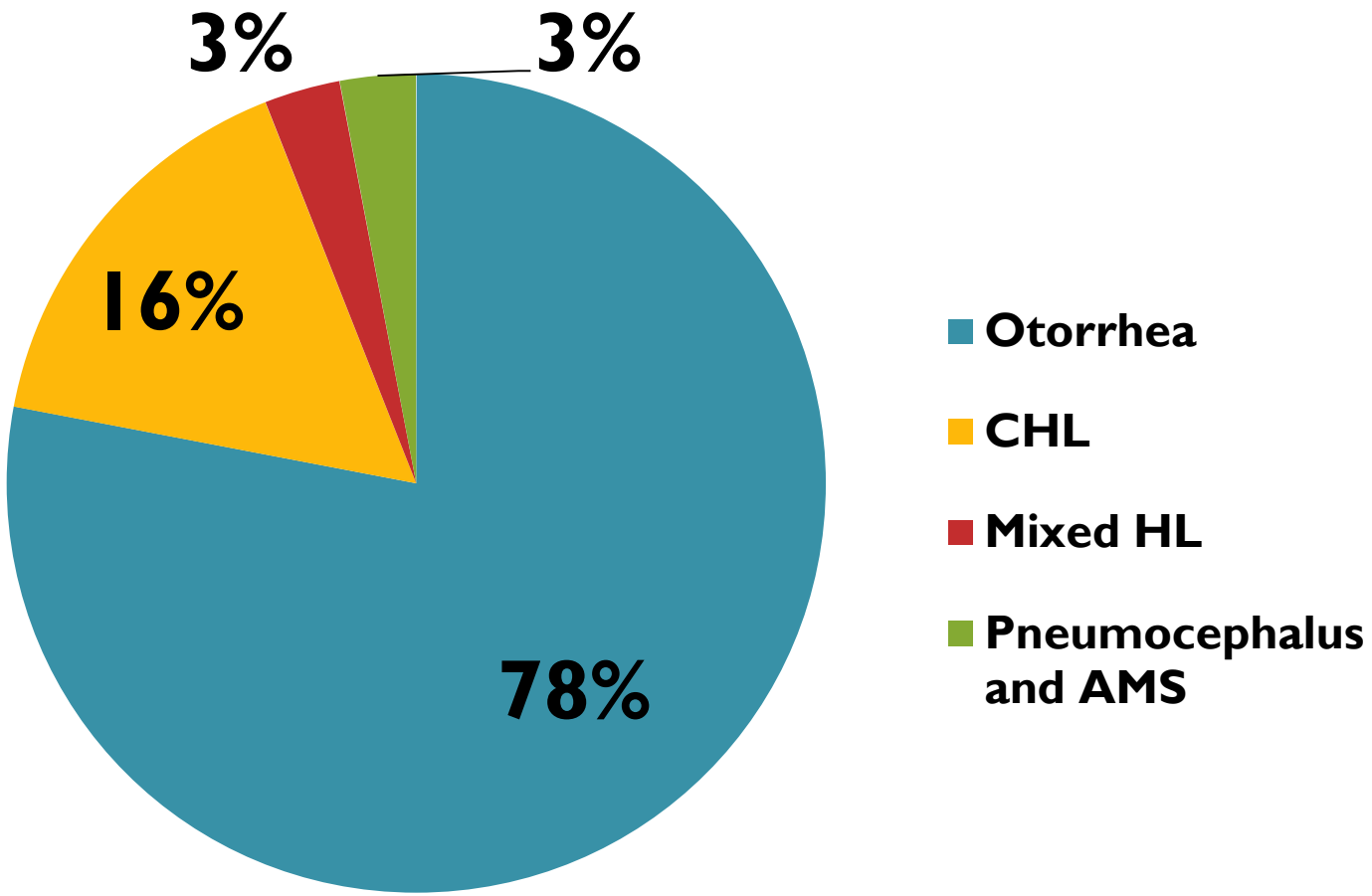
Methods

- Patients with a history of chronic ear disease, cholesteatoma, prior mastoid surgery, head trauma, neoplastic process or iatrogenic injury were excluded

Demographics

Characteristics	No (%)
Total number of patients	32
Sex	
Male	10 (31)
Female	22 (69)
Average Age	56 yrs (range 9-82yrs)
Average Follow up	23 months (range 1-93 months)

Presenting signs and symptoms



4 (12.5%) patients had a history of meningitis

Results:

- Thirty-two patients underwent 37 operations
- Three patients had bilateral defects
- There were 21 repairs on the left and 16 on the right
- The majority underwent a middle fossa craniotomy for repair (27/32)

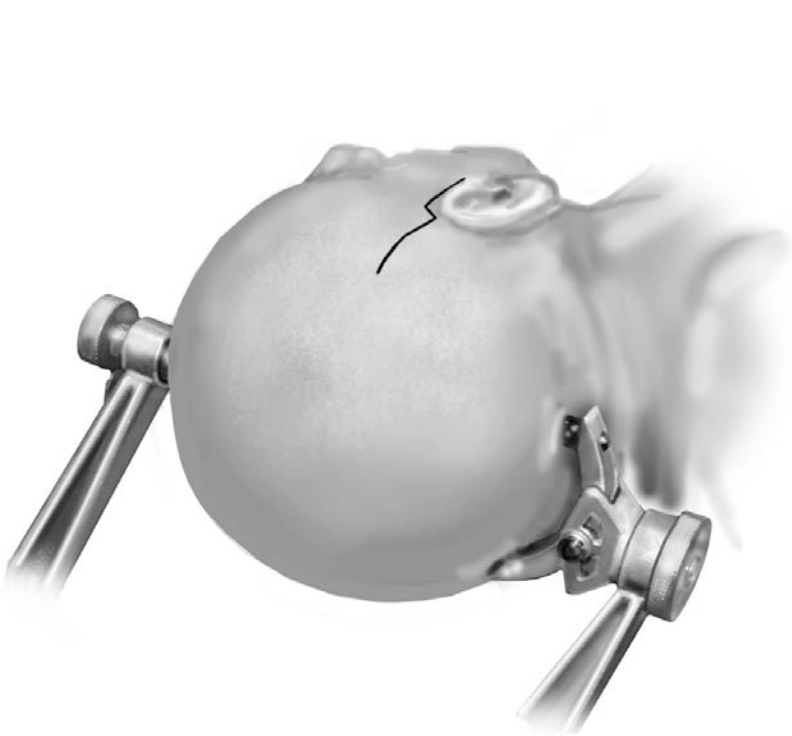
Results:

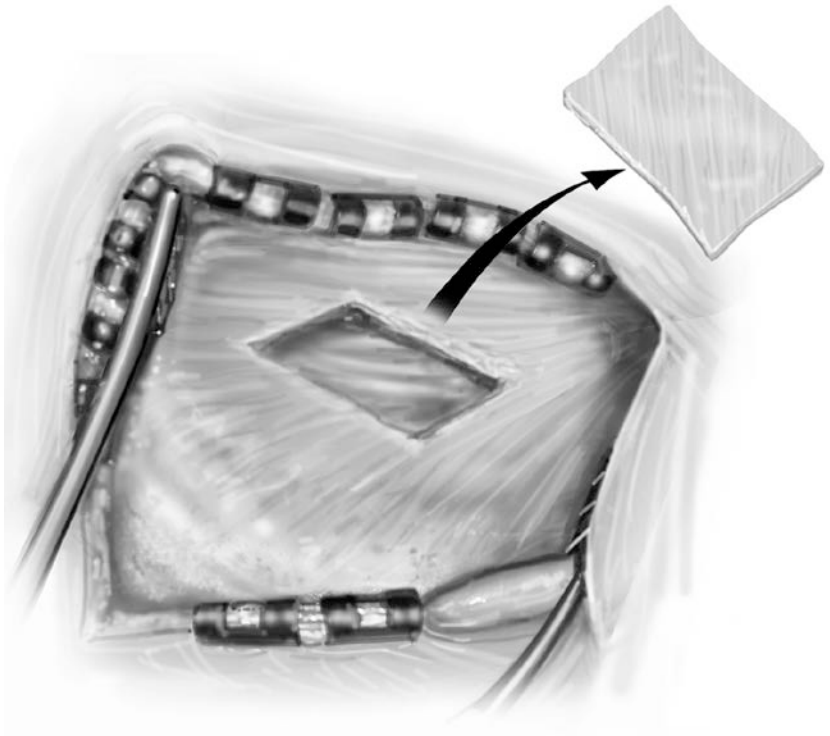
- Three patients (8%) underwent revision surgery
  - Two had untreated intracranial hypertension (ICP 24.5 and 24 cm H2O)
  - Two failed after a MCF repair and the other had undergone a transmastoid repair

Surgical Repair:

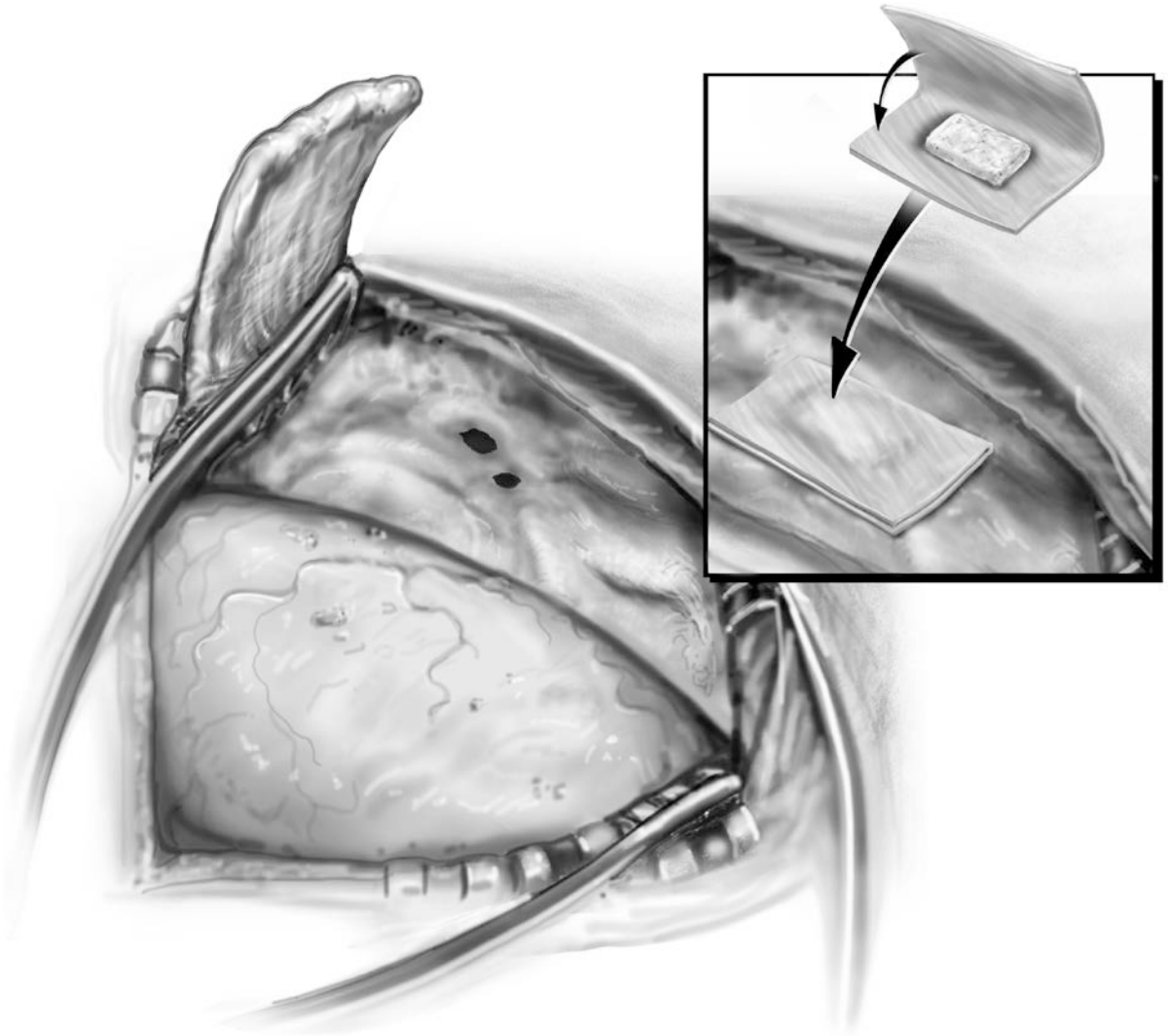
- Middle fossa craniotomy is the preferred approach for repair of:
  - tegmen tympani defects
  - large tegmen mastoideum defects
  - multiple tegmen defects
  - Surgeon preference

Surgical Technique: Middle Cranial Fossa Approach

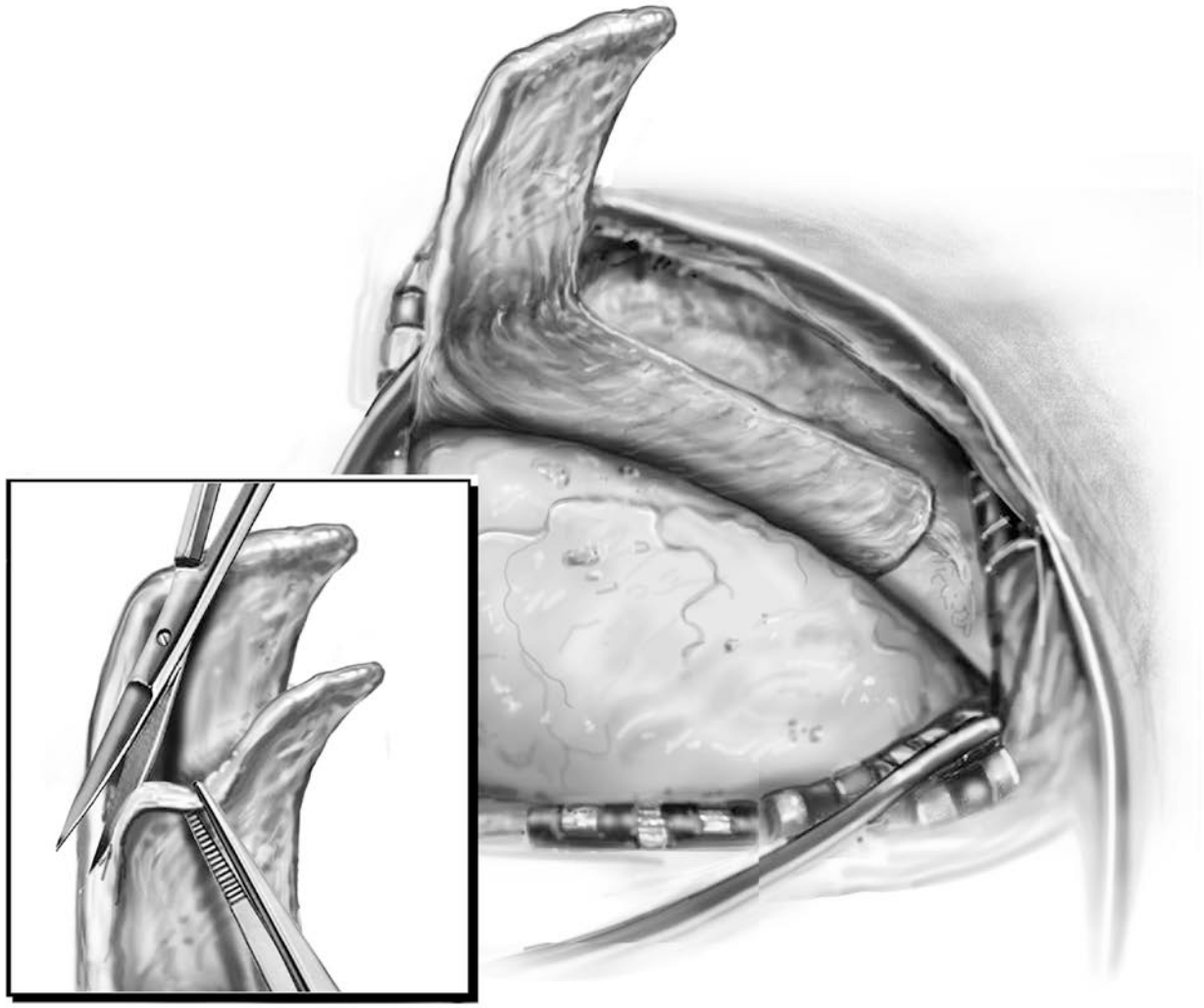


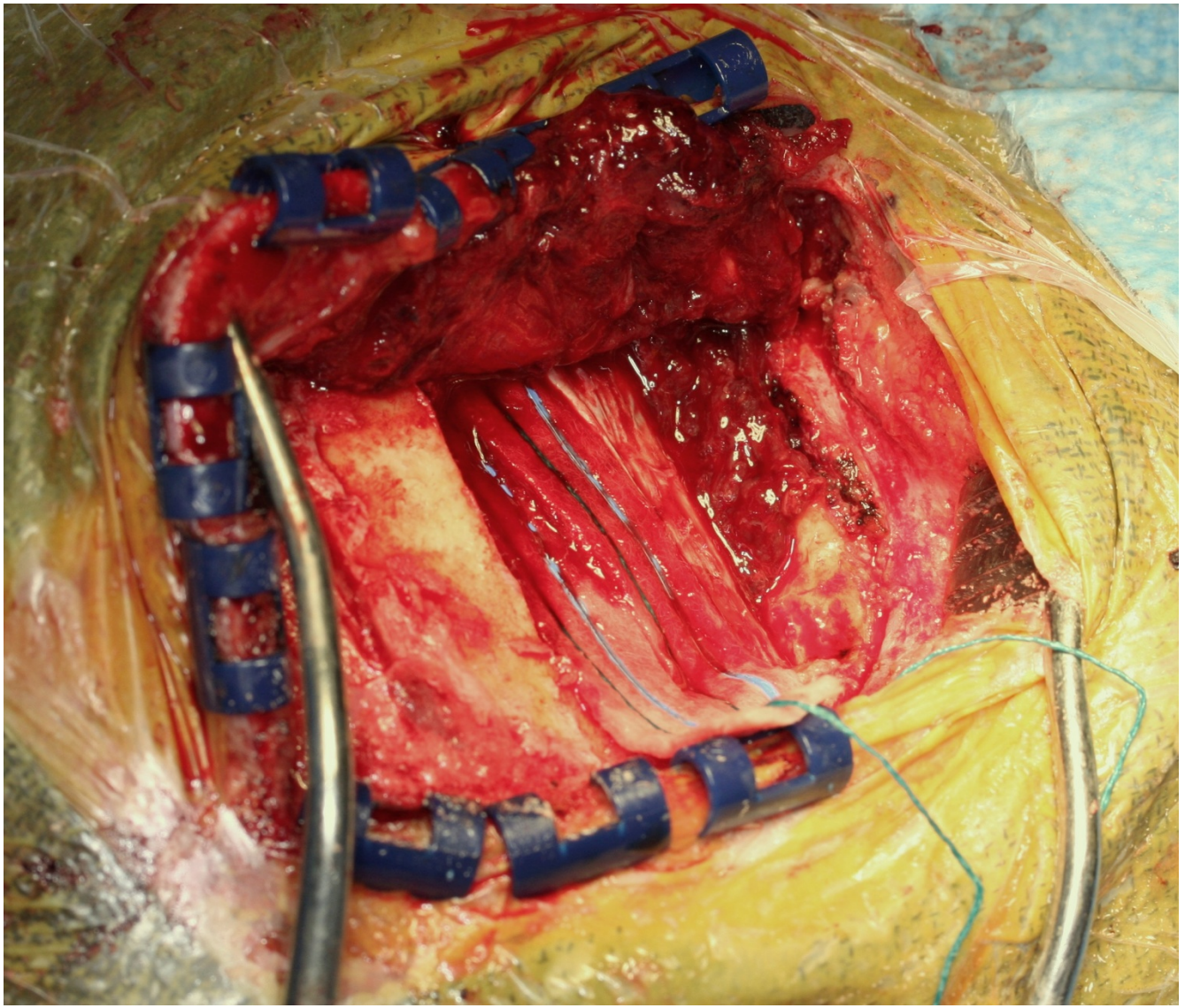


Surgical Technique: Middle Cranial Fossa Approach



Surgical Technique: Middle Cranial Fossa Approach





Surgical Technique:

- Dural defects repaired with
  - duragen inlay
  - muscle plug
  - primary closure

- Lumbar drains placed intra-operatively and left for 3 days

Results: BMI

- Average BMI was in the obese range at 35.0 kg/m² (range 18.7-53.2 kg/m²)
- 19% of patients were overweight (BMI 25-30 kg/m²)
- 66% of patients were obese (BMI >30kg/m²)

Results: ICP

- Opening pressures were measured at time of surgical repair during the placement of an intraoperative lumbar drain or within a month after surgical repair

Results: ICP

- The mean ICP was 23.4 cm H2O (median 24, range of 13-36 cm H20)
- Twenty patients (63%) had ICP >20 cm H20
- Thirteen (41%) had an ICP ≥25 cm H20

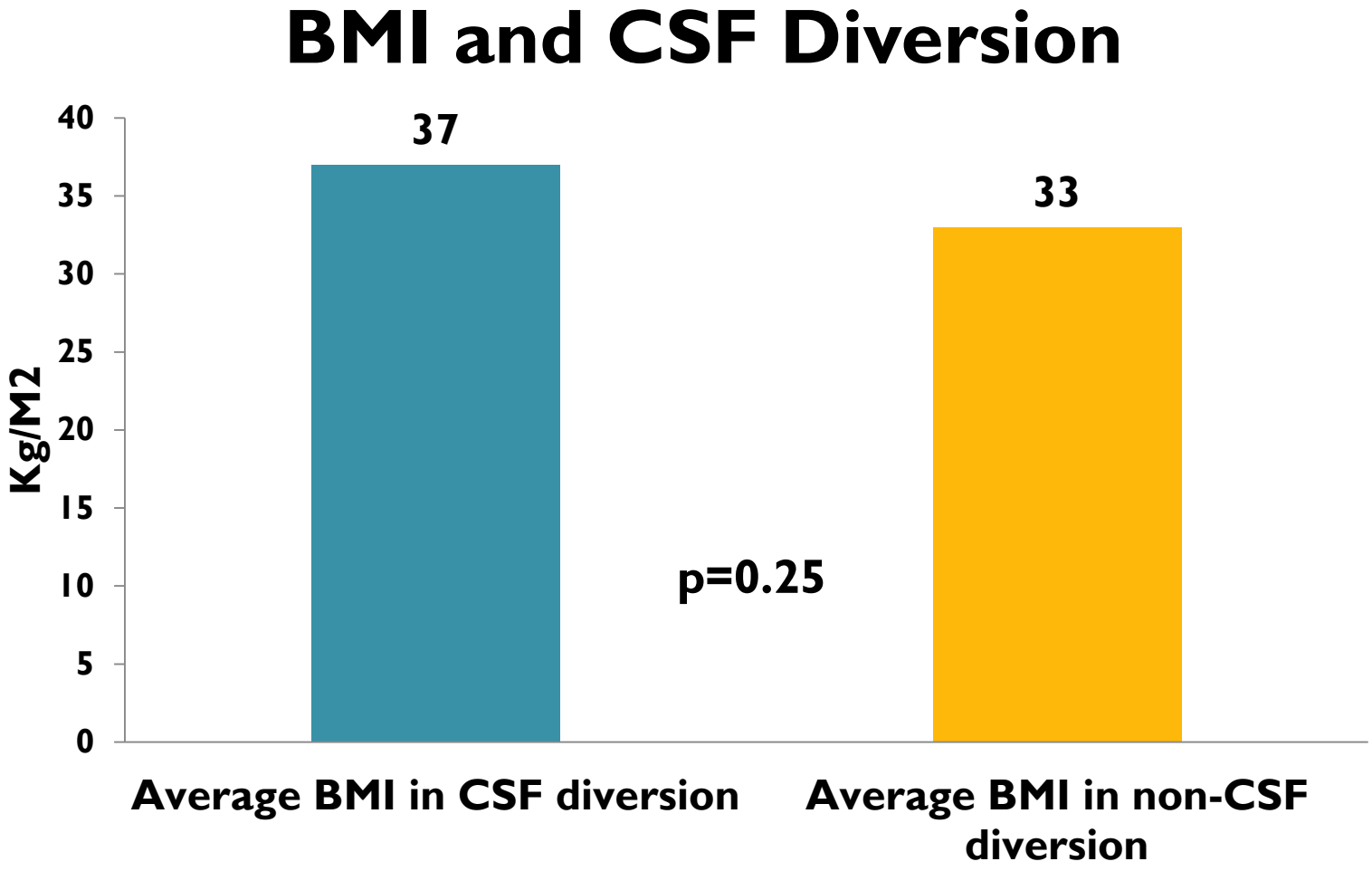
Results: CSF diversion

- Seventeen patients (53%) were treated with CSF diversion
  - Sixteen with a V-P (ventriculoperitoneal) shunt and one with an L-P (lumboperitoneal) shunt

Results: BMI and CSF diversion

- The average BMI in this group was 37 kg/m² (range 18.7-53.2 kg/m ²)
- Average BMI in the non-shunted group was 33 kg/m² (range 20-53 kg/m²)
- Difference was not significant (p=0.25)

Results

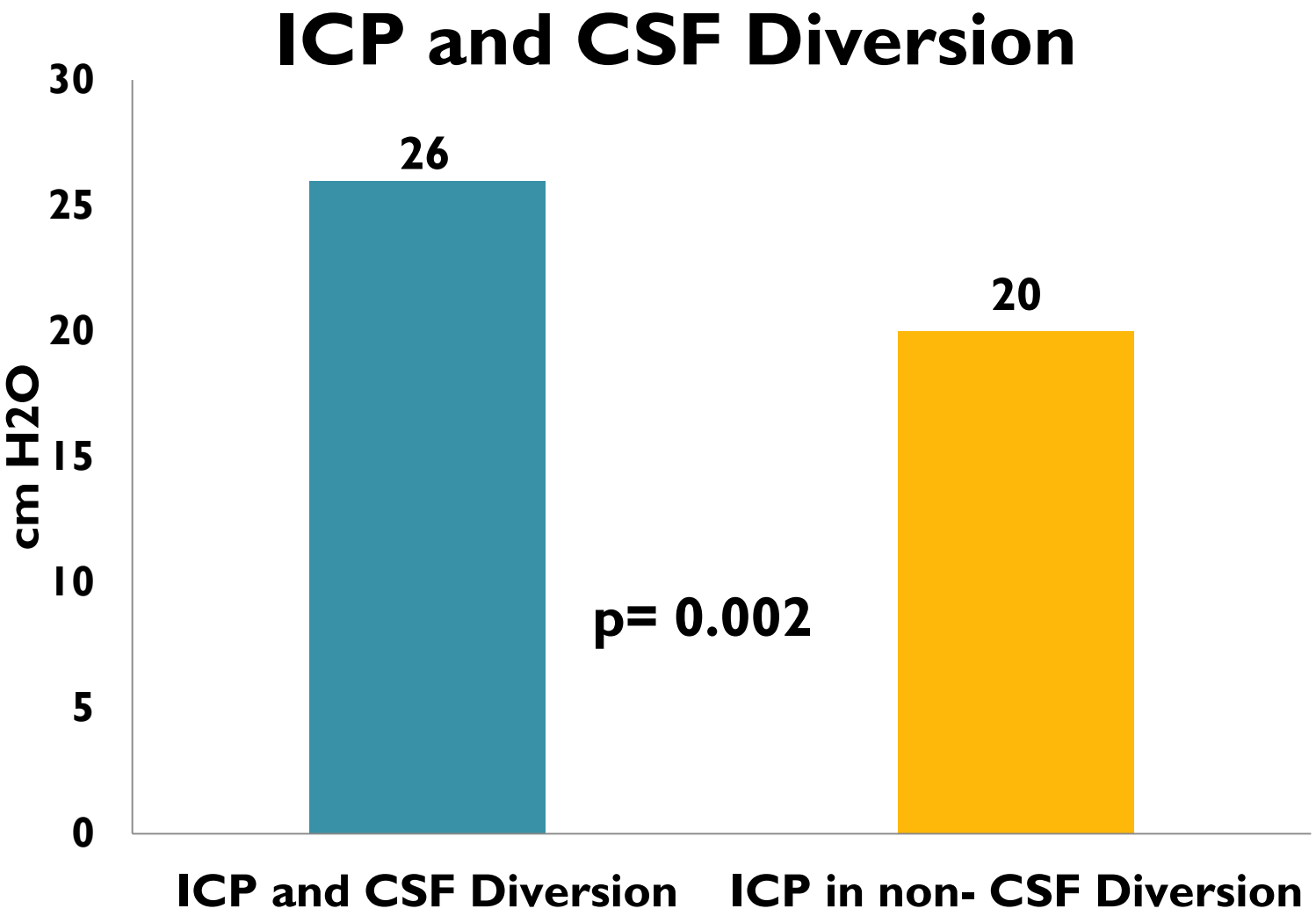

BMI and CSF Diversion
Kg/M2
40
35
30
25
20
15
10
5
0
37
33
p=0.25
Average BMI in CSF diversion
Average BMI in non-CSF diversion

Results: ICP and CSF Diversion

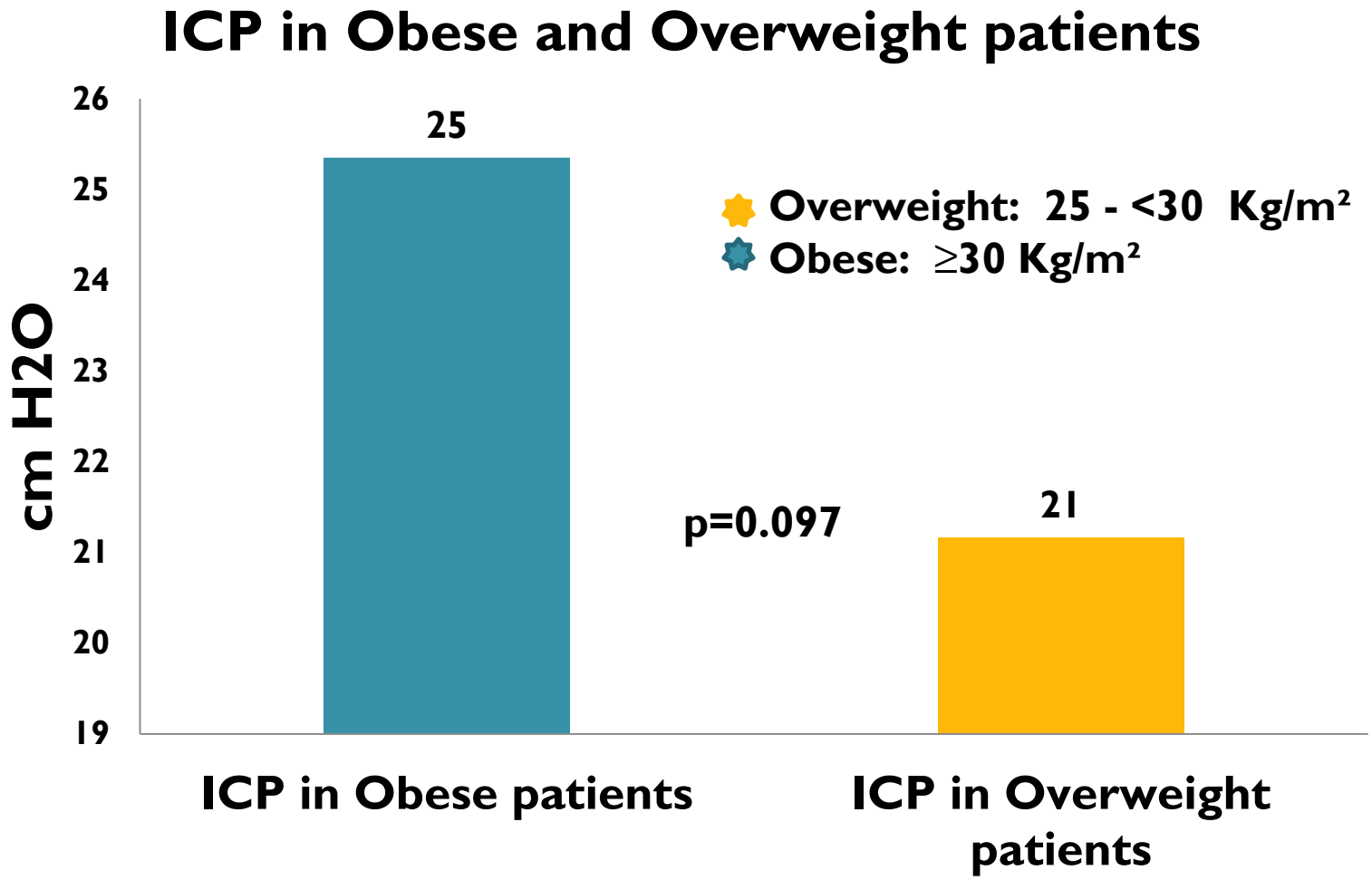
- The average ICP in patients who underwent CSF diversion was 26.2 cm H2O (median 26cm H2O)

- The average ICP in those without CSF diversion was 19.6cm H2O (median was 18.8 cm H2O)

Results:


ICP and CSF Diversion
30
25
20
15
10
5
0
cm H2O
26
20
p= 0.002
ICP and CSF Diversion
ICP in non- CSF Diversion

Results: ICP and BMI



Summary

- Sixty-nine percent of patients were female
- Eighty-five percent were overweight or obese
- Average BMI was greater in the group that underwent CSF diversion, although not statistically significant
- The correlation coefficient between BMI and ICP was 0.33 suggesting these variables are moderately correlated

Summary

- Sixty-three percent of our patients had an ICP greater than >20 cm H20
- Fourty-one percent had an ICP ≥25 cm H20
- Patients with an untreated ICP over 20 showed a strong trend toward recurrent CSF leaks (p=0.054)

Summary

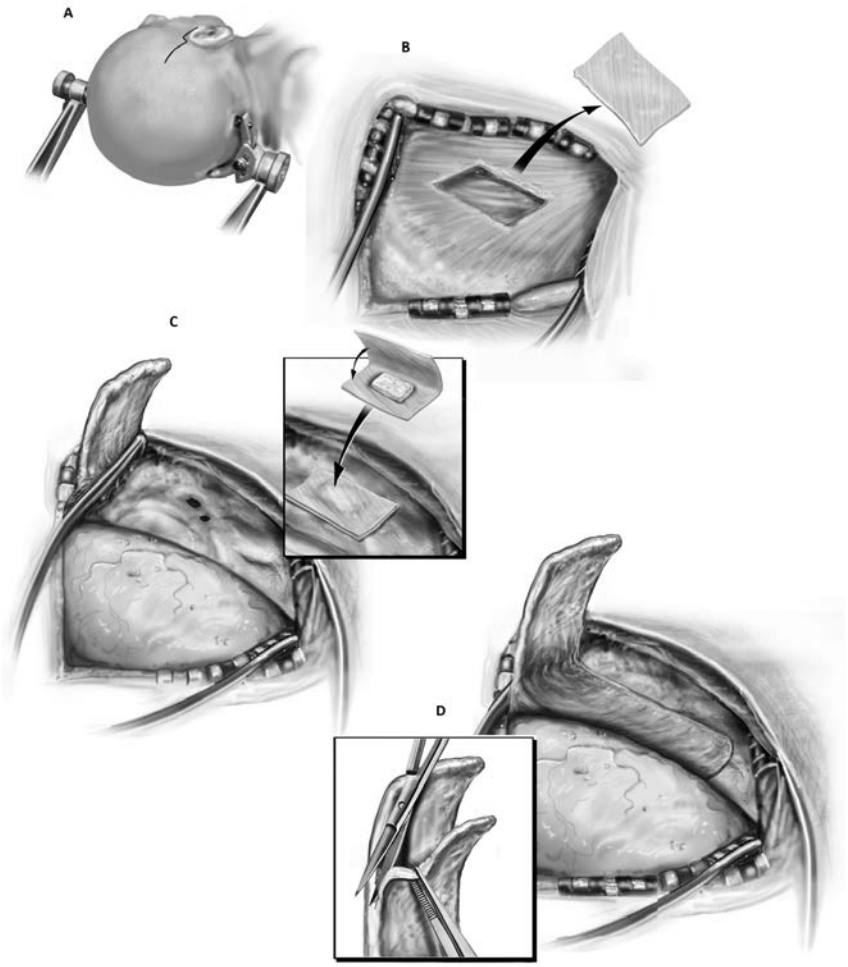
- The majority of our patients, 53%, required CSF diversion
- We proceed with CSF diversion when:
  - ICP ≥25 cm H2O
  - Recurrent CSF leak
  - CSF otorrhea with existing diagnosis of pseudotumor cerebri
- ICP in high teens to low twenties; proceed with a trial of Diamox

Conclusion

- As with IIH, patients with spontaneous CSF otorrhea tend to be obese middle aged females
- Patients with spontaneous CSF otorrhea should have ICP measured
- Patients with spontaneous CSF otorrhea and intracranial hypertension may need to be managed aggressively with CSF diversion procedures

Conclusion

- We believe that having a vascularized flap as part of a multilayered reconstruction offers an advantage in the healing process and long term integrity of the repair



Thank you