

Management of Cerebrospinal Fluid Leaks After Basilar Skull Fractures

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INTRODUCTION

Cerebrospinal fluid (CSF) leaks are an uncommon but consequential effect of skull base fractures.

They increase the risk for meningitis, hematomas, and herniations; however, most of them can be managed conservatively.

Although, early identification and treatment is essential to prevent detrimental complications, especially in cases that require surgical repair.

Few studies have explored the factors associated with the development of traumatic CSF leaks and required surgical repair.

This project used data from a national database to investigate the variables that contribute to these outcomes.

METHOD

The national trauma data bank (NTDB) was queried from 2019 to 2023 for patients with traumatic fractures of the skull base.

ICD10 codes were used to identify concurrent diagnoses and procedures for each patient. Additionally, patient demographics and injury details were extracted from the database.

Linear regression models were used to identify variables with significant association with a diagnosis of CSF leak after skull base fractures, and those associated with the need for surgical repair.

RESULTS

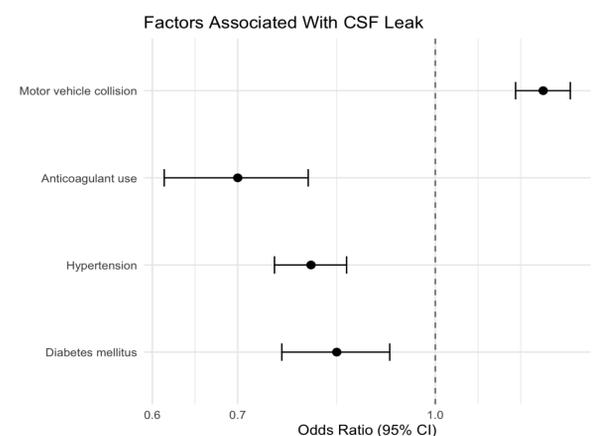
Our data query resulted in 190,657 patients with a skull base fracture between 2019 and 2023. Of these, 6,948 (3.6%) had a traumatic CSF leak as well. 25.7% of the patients were female overall, and male sex was associated with increased rate of CSF leaks (OR 0.829; 95%CI [0.782-0.877]).

The average age of the participants was 41.7 ± 21.9 years old, and a younger age was significantly correlated with CSF leaks (p -value <0.001). Additional factors associated with increased risk of CSF leak were injury by motor vehicle collision (1.215 [1.156-1.276]), lower Glasgow coma scale score, and higher injury severity score (p -value <0.001).

While anticoagulant use (0.700 [0.613-0.795]) and diagnosis of hypertension (0.799 [0.748-0.852]) or diabetes mellitus (0.837 [0.758-0.921]) were associated with a lower rate of CSF leak. The multivariable linear regression model included sex, age, ISS, and GCS. Out of the 6,948 patients with a CSF leak, 282 (4.1%) had a surgical repair.

Younger males were more likely to have a surgical repair done. An increased ISS was associated with an increased rate of surgical repair (p -value =0.002) while GCS was not significantly correlated with it. Even accounting for ISS and GCS, surgical repair was associated with increased length of stay in the hospital (p -value <0.001) and thrombosis (1.791 [1.016-2.945]) during their stay. Surgical repair did not correlate with differences in surgical site infection rates.

	Total (190,657)	CSF Leak (6,948)	No CSF Leak (183,709)
Age	41.7 ± 21.9	39.4 ± 21.2	41.8 ± 22.0
Female	49,021	1,558	47,463
Anticoagulant Use	9,322	243	9,079
Hypertension	37,588	1,142	36,446
Diabetes Mellitus	14,538	450	14,088



DISCUSSION

Although CSF leaks occur in around 1-3% of traumatic brain injuries, the variables associated with them are poorly defined.

This project found that age and sex may contribute to both the risk for CSF leaks and can help identify those that require surgical repair.

CONCLUSION

Future studies should further investigate how these patient demographics influence outcomes and treatment of traumatic CSF leaks.

ACKNOWLEDGEMENTS

We would like to acknowledge the American College of Surgeons and their work developing and maintaining the National Trauma Data Bank.