

Review of Literature on Post-traumatic Epilepsy in Extradural Hematoma Patients: A Case for Further Comprehensive Research

Adesh Shrivastava¹ Md Moshir Rahman^{2,✉} Luis Rafael Moscote-Salazar^{3,4} Rajeev Ravish Keni⁵
Manas Prakash¹ Amit Agrawal¹

¹Department of Neurosurgery, All India Institute of Medical Sciences, Saket Nagar, Bhopal, Madhya Pradesh, India

²Department of Neurosurgery, Holy Family Red Crescent Medical College, Dhaka, Bangladesh

³Department of Neurosurgery, Paracelsus Medical University, Salzburg, Austria

⁴Department of Neurosurgery, Universidad de Cartagena, Cartagena, Colombia

⁵Department of Neurology, Narayana Medical College and Hospital, Nellore, Andhra Pradesh, India

Address for correspondence Adesh Shrivastava, MCh, Department of Neurosurgery, All India Institute of Medical Sciences, Saket Nagar, Bhopal 462020, Madhya Pradesh, India (e-mail: dr.adesh.shrivastava@gmail.com).

Indian J Neurotrauma:2021;18:95–96

The early and aggressive management of extradural hematomas (EDH) is a classical teaching during neurosurgery residency.^{1–3} Posttraumatic seizures (PTS) after EDH share a significant percentage of causality, but apparently remain a less studied entity. The major literature analyzing EDH with PTS dates back to the late 20th century and there are only a couple of recent studies.^{4–7} Additionally, an often-debated issue is the role of prophylactic antiepileptic drugs (AEDs) in patients suspected of having high chances of developing PTS.^{8,9} Uniform use of AEDs in all cases can lead to drug-related side effects and complications and in some cases unnecessary AED dependence.^{9,10}

An online search PubMed database was performed by using literature and using the search strategy “(((“extradural haematoma”[All Fields] OR “hematoma, epidural, cranial”[MeSH Terms] OR (“hematoma”[All Fields] AND “epidural”[All Fields] AND “cranial”[All Fields]) OR “cranial epidural hematoma”[All Fields] OR (“extradural”[All Fields] AND “hematoma”[All Fields]) OR “extradural hematoma”[All Fields]) AND (“epilepsy”[MeSH Terms] OR “epilepsy”[All Fields])) AND (“seizures”[MeSH Terms] OR “seizures”[All Fields]) AND (“anticonvulsants”[All Fields] OR “anticonvulsants”[MeSH Terms] OR “anticonvulsants”[All Fields]))” on PTS after EDH returned only a handful of articles (►Fig. 1).^{4,5,7} Three studies were excluded as there was no clear categorization of intracranial hematomas,¹¹ diagnosis of extradural hematoma not clearly mentioned,¹² and no clear description of seizure groups.¹³

One of the early reports was by Bryan Jennett from the Institute of Neurological Sciences, Glasgow in 1975.⁵ The peculiarity of this report was that the case series was of

the pre-CT era and surgical interventions were based only on clinical findings. Among patients of seizures due to posttraumatic intracranial hematomas (excluding chronic subdural hematomas), EDH was reported as a cause of early seizures (within 1 week of head injury) in 10% (15/146) and late seizures in 22% (13/59) patients. Jennett also found out that only 2% of early PTS patients had an evolving EDH. The next significant report came in 1991 by Jamjoom et al from Bristol.⁴ They categorized EDH patients with epilepsy in two subgroups, based on CT findings into those with exclusive EDH and those with other intradural traumatic insults.⁴ Although they found the overall incidence of late epilepsy to be 6%, in the pure EDH group, it was only 2% as against 17% of those with additional intradural damage. Another data analysis from a multicentre North American TBI database of 795 patients from 1989 to 2000 was reported by Ritter et al in 2016.⁷ Among the various findings, EDH was found to be the cause of early and late PTS in 14.5% and 16.9%, respectively. The most recent report on the incidence of PTS due to EDH came from the series of 484 TBI patients by Pormontree et al from Thailand in 2019.⁶ The authors analyzed early PTS in TBI patients from April 2017 to March 2018. Twenty-seven patients (5.6%) had early PTS due to various intracranial insults. Among these, EDH was found to have an adjusted odds ratio of 3.98 on multivariate analysis (p value = 0.001).

PTS is a known complication of head injury.^{6,7,10,14–17} Whether they occur in the early (within a week) or in late posttraumatic period, this sequela of brain injury can significantly deteriorate the quality of life and is considered an independent factor.^{6,7,14–17} All the contemporary studies on

published online
October 9, 2020

DOI <https://doi.org/10.1055/s-0040-1718243>
ISSN 2277-954X.

©2020. Neurotrauma Society of India.

This is an open access article published by Thieme under the terms of the Creative Commons Attribution-NonDerivative-NonCommercial-License, permitting copying and reproduction so long as the original work is given appropriate credit. Contents may not be used for commercial purposes, or adapted, remixed, transformed or built upon. (<https://creativecommons.org/licenses/by-nc-nd/4.0/>).

Thieme Medical and Scientific Publishers Pvt. Ltd. A-12, 2nd Floor, Sector 2, Noida-201301 UP, India

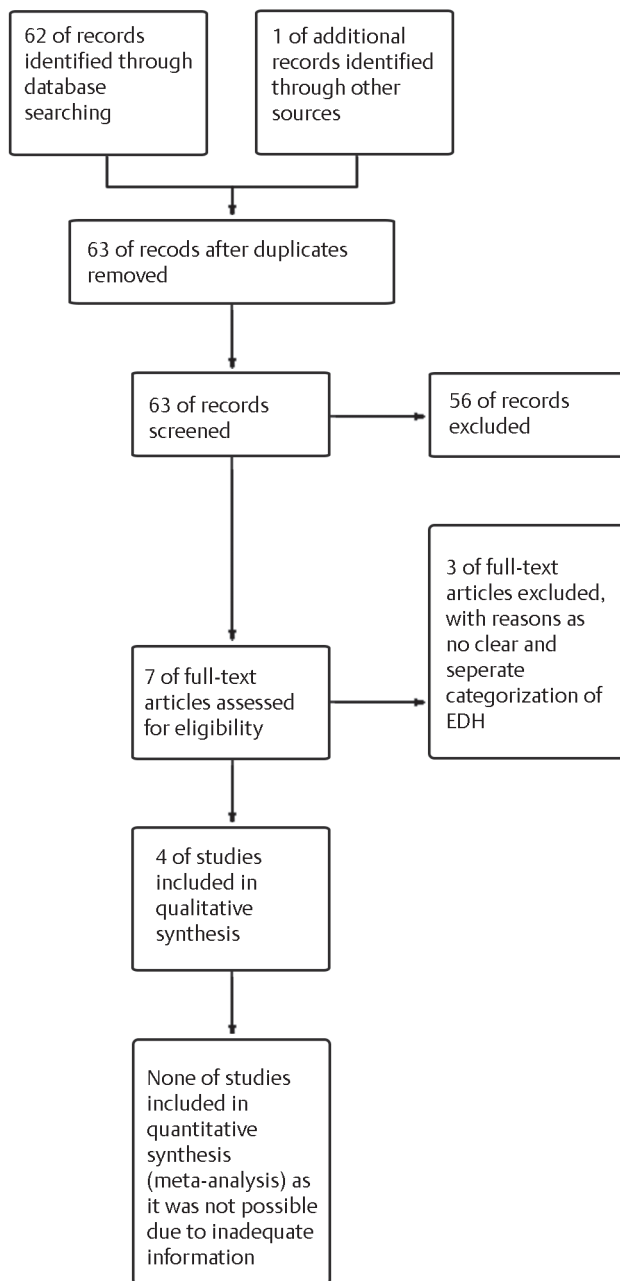


Fig. 1 Prisma chart of the studies extracted using keyword-based PubMed search.

posttraumatic epilepsy (PTE) are in patients with intradural injuries.^{10,16,18} Hence, considering the significant share of PTE attributed to EDH in the tune of 15 to 20%, there is an emergent need to undertake a well-formulated study to understand the exact correlation in the current advanced imaging era and then accordingly tailor the prophylactic antiepileptic treatment.

Conflict of Interest

None declared.

References

- 1 Khairat A, Waseem M, Epidural Hematoma. StatPearls. Treasure Island (FL): StatPearls Publishing; 2020
- 2 Paiva WS, Andrade AF, Mathias Júnior L, et al. Management of supratentorial epidural hematoma in children: report on 49 patients. *Arq Neuropsiquiatr* 2010;68(6):888–892
- 3 Rosenthal AA, Solomon RJ, Eyerly-Webb SA, et al. Traumatic epidural hematoma: patient characteristics and management. *Am Surg* 2017;83(11):e438–e440
- 4 Jamjoom AB, Kane N, Sandeman D, Cummins B. Epilepsy related to traumatic extradural haematomas. *BMJ* 1991;302(6774):448
- 5 Jennett B. Epilepsy and acute traumatic intracranial haematoma. *J Neurol Neurosurg Psychiatry* 1975;38(4):378–381
- 6 Parmontree P, Tunthanathip T, Doungngern T, Rojpitulstitt M, Kulviwat W, Ratanalert S. Predictive risk factors for early seizures in traumatic brain injury. *J Neurosci Rural Pract* 2019;10(4):582–587
- 7 Ritter AC, Wagner AK, Fabio A, et al. Incidence and risk factors of posttraumatic seizures following traumatic brain injury: a traumatic brain injury model systems study. *Epilepsia* 2016;57(12):1968–1977
- 8 Temkin NR, Dikmen SS, Anderson GD, et al. Valproate therapy for prevention of posttraumatic seizures: a randomized trial. *J Neurosurg* 1999;91(4):593–600
- 9 Temkin NR, Dikmen SS, Wilensky AJ, Keihm J, Chabal S, Winn HR. A randomized, double-blind study of phenytoin for the prevention of post-traumatic seizures. *N Engl J Med* 1990;323(8):497–502
- 10 Agrawal A, Timothy J, Pandit L, Manju M. Post-traumatic epilepsy: an overview. *Clin Neurol Neurosurg* 2006;108(5):433–439
- 11 Younus SM, Basar S, Gauri SA, et al. Comparison of phenytoin versus levetiracetam in early seizure prophylaxis after traumatic brain injury, at a tertiary care hospital in Karachi, Pakistan. *Asian J Neurosurg* 2018;13(4):1096–1100
- 12 Phillips G. Traumatic epilepsy after closed head injury. *J Neurol Neurosurg Psychiatry* 1954;17(1):1–10
- 13 Sherman WD, Apuzzo MLJ, Heiden JS, Petersons VT, Weiss MH. Gunshot wounds to the brain—a civilian experience. *West J Med* 1980;132(2):99–105
- 14 Annegers JF, Hauser WA, Coan SP, Rocca WA. A population-based study of seizures after traumatic brain injuries. *N Engl J Med* 1998;338(1):20–24
- 15 Fernández-Abinader JA, González-Colón K, Feliciano CE, Mosquera-Soler AM. Traumatic brain injury profile of an elderly population in Puerto Rico. *P R Health Sci J* 2017;36(4):237–239
- 16 Salazar AM, Jabbari B, Vance SC, Grafman J, Amin D, Dillon JD. Epilepsy after penetrating head injury. I. Clinical correlates: a report of the Vietnam Head Injury Study. *Neurology* 1985;35(10):1406–1414
- 17 Temkin NR. Risk factors for posttraumatic seizures in adults. *Epilepsia* 2003;44(s10):18–20
- 18 Jennett B. Epilepsy after non-missile head injuries. *Scott Med J* 1973;18(1):8–13