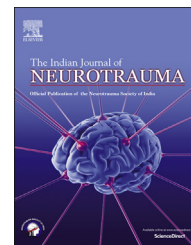


Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/ijnt

Case Report

Post-traumatic retroclival epidural hematoma with atlantoaxial dislocation: A rare case report and review of literature



Rakesh Kumar*, Rashim Kataria, Vimal Sardana, Pankaj Gupta

Department of Neurosurgery, Sawai Man Singh Medical Collage, Jaipur, Rajasthan, India

ARTICLE INFO

Article history:

Received 19 October 2014

Accepted 20 November 2014

Available online 15 December 2014

Keywords:

Head injury

Epidural hematoma

Retroclival

Atlanto-axial dislocation

ABSTRACT

Retroclival epidural hematoma (REDH) is a rare entity. Only 44 cases of REDH are reported in available literature so far. Most of the cases of REDH are post traumatic and occur in the pediatric age group. Some of the cases reported in the literature are associated with atlanto occipital dislocation, however the co-occurrence of REDH and atlantoaxial dislocation is extremely rare, and only two cases have been reported so far. We report a case of REDH with AAD (atlantoaxial dislocation) in 10 years-old-male child, who presented on the same day of injury with quadriparesis and pain in suboccipital region after a road traffic accident. The patient recovered well with conservative management. The aim of reporting this case is to emphasize the need of repeat MRI/CT scan of CV JUNCTION in cases (especially in pediatric age group) not showing any abnormality in the initial cervical or cranial CT scans in patients presenting with quadriparesis. The available literature is also reviewed in detail.

Copyright © 2014, Neurotrauma Society of India. All rights reserved.

1. Introduction

Posterior fossa epidural hematomas comprise only 4–12.9% of all EDH and REDH is a rare entity comprising only 1.2–12.9% of all posterior fossa epidural hematomas.¹ Due to its location it is frequently under-diagnosed on initial cranial CT scans and MRI. REDH is almost exclusively found in the pediatric age group.² It should be suspected in patients of head-injury due to high speed motor vehicle accident in the children. On clinical/radiological suspicion of REDH, an MRI of the brain and upper cervical spine is helpful in the detection of REDH. Sudden hyperflexion or hyperextension at the craniovertebral junction following high-speed motor vehicle accident is proposed

mechanism of injury responsible for this (basilar venous plexus or dorsal meningeal branch of meningo hypophyseal trunk) has been reported to be one of the most important factors resulting in the formation of a REDH.² Atlanto-occipital dislocation, atlanto-axial dislocation, occipital condyle fracture and clival fracture are reported with cases of REDH, hence these should always be ruled out.^{2–6} Most of the cases are managed conservatively with good prognosis.

2. Case report

A 10-year-old male child presented with history of being hit by high speed vehicle while crossing the road. Patient had history

* Corresponding author. Tel.: +91 9667652170; fax: +91 01412300664.

E-mail address: rksingh2226@gmail.com (R. Kumar).

<http://dx.doi.org/10.1016/j.ijnt.2014.11.008>

0973-0508/Copyright © 2014, Neurotrauma Society of India. All rights reserved.

of loss of consciousness and a single episode of vomiting. On examination the patient was conscious, bilateral pupil were equal and reacting to light. He had quadriplegia (left greater than right) with power 4-/5 in left sided limbs and 4+/5 in right sided limbs on MRC (*medical research council grading*) grading scale. He also had pain in suboccipital region. Deep tendon reflexes in all four limbs were +1 and left side Babinski was positive with right mute planter reflex. Rest of the examination was within normal confines. Vital parameters were normal. Computed tomogram (CT) scan head was done in emergency which initially appeared normal but on reviewing the scan, a retroclival epidural hematoma was found to be present (Fig. 1). Neck of patient was immobilized with a Philadelphia brace and since there was a possibility of REDH, CT scan and MRI craniovertebral junction and cervical spine were done. CT craniovertebral junction and cervical spine showed increased atlanto-dental interval suggestive of atlantoaxial dislocation. A well defined hyperdensity was noted posterior to the dens extending superiorly and posterior to the clivus suggestive of epidural hemorrhage (Fig. 2).

MRI cervical spine and CV junction in addition to atlantoaxial dislocation also showed the posterior displacement of body of dens causing stretching of tectorial membrane and mild compression of the cervico medullary junction. There was disruption in continuity of tectorial membrane at the upper clival region (Fig. 3). Patient was managed conservatively with immobilization. Patient improved gradually and was discharged on seventh post admission day with power 4+/5 in all four limbs. On eight months follow up patient is well without any neurological deficit.

3. Discussion

Retroclival extradural hematoma is a rare variant of epidural hematoma, estimated to comprise 1.2%–12.9% of all posterior



Fig. 1 – Axial ct brain showing retroclival extradural hematoma.

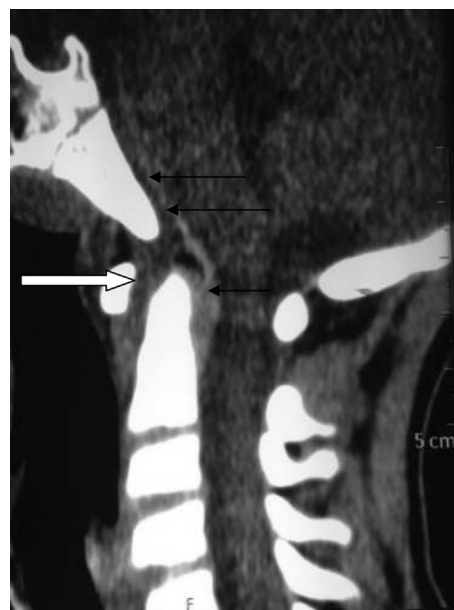


Fig. 2 – CT CV junction and cervical spine (after seven days of injury) showing atlantoaxial dislocation (white arrow) and shows well defined hyperdensity noted posterior to dens of c2 vertebrae extending superiorly posterior to clivus suggestive of epidural hemorrhage (black arrows).

fossa epidural hematomas.¹ The first case was described by Orrison et al., in 1986.³ Most of the cases of REDH are post traumatic and in pediatric age group. The forty four reported cases include 38 pediatric and 6 adult cases of REDH (Table 1). Trauma in form of motor vehicle accident is the most common mode of injury present in 42 reported cases. Only two



Fig. 3 – MRI CV junction and cervical spine showing disruption in continuity of tectorial membrane at upper clival region with stripping and stretching of tectorial membrane (black arrows).

Table 1 – Reported cases of REDH.

Case no.	Author	Year	Age (year)	Mode of injury	Associated injury	Gcs score	Treatment	Outcome
1.	Orrison et al. ³	1986	8	Rta	Aod	3	NA	Death
2.	Kurosu et al.	1990	11	Rta	NA	7	Conservative	Gr
3.	Papadopoulos et al. ⁶	1991	10	Rta	Aod	4	NA	Gr
4.	Castillo et al.	1994	10	Rta	NA	Coma	NA	Gr
5.	Marks et al. ⁴	1997	8	Rta	C1-c2 dislocation	6	NA	Gr
6.	Mizushima et al.	1998	8	Rta	C1-c2 dislocation	6	NA	Gr
7.	Mullar et al.	1998	7	Rta	NA	6	NA	Gr
8.	Fuentes et al.	2000	47	Rta	B/l occipital condyle Fracture	Na	NA	Gr
9.	Khan and zumstein	2000	19	Rta	Clival fracture	15	NA	Gr
10.	Suliman et al.	2001	16	Rta	NA	10	NA	Gr
11.	Yang et al.	2003	5	Rta	NA	7	NA	Gr
12.	Paterakis et al.	2005	10	Rta	Clival fracture	12	NA	Gr
13.	Agrawal and cochrane	2006	8	Rta	NA	7	NA	Gr
14.	Calisaneller et al.	2006	11	Rta	NA	15	NA	Gr
15-16	Guillaume and menezes ⁷	2006	5,8	Rta	NA	7,15	NA	Gr
17.	Itshayek et al.	2006	12	Rta	NA	15	NA	Gr
18.	Ratilal et al. ¹	2006	26	Rta	NA	13	NA	Gr
19.	Vera et al.	2007	5	Rta	Atlanto occipital dislocation	3	NA	Death
20.	Kown et al. ⁸	2008	11	Rta	NA	15	NA	Gr
21-28	Tubbs et al. ²	2010	Na	Rta	Atlanto occipital dislocation (2)	8	Surgical fusion (2) Conservative (4)	Neurological impairment (1) Death (2) Gr (5)
29-39	Meoded et al. ⁵	2011	1.9-19 M (4) F (6)	Rta (8) Fall (2)	Left occipital condyle fracture (1)	5-15	Conservative (9) Surgical (1)	Neurological impairment (3) Gr (7)
40	Tahir et al.	2011	12/f	Rta	NA	11	Conservative	Gr
41	Becco de souza r et al.	2011	8/f	Rta	NA	Na	Conservative	Gr
42	Cameron m. Et al	2011	10/f	Rta	NA	13	Conservative	Gr
43.	Chu et al.	2012	28/m	Work based accident	Left occipital condyle fracture	15	Conservative	Gr
44	Bovet jp et al. ⁹	2013	68/m	Rta	Odontoid fracture	15	NA	Death
45	Present case	2014	10/m	Rta	Aad	13	Conservative	Gr

Rta: road traffic accident, Gr: good recovery, NA: not available.

reported cases injury is due to fall. In children due to relatively small occipital condyle and horizontal articulation between cranium and atlas, the cranio cervical junction is less stable.⁷ The ligamental injury at craniovertebral junction in children is predisposed due to increased ligamental elasticity.⁶ Relative instability of the craniovertebral junction in children has been proposed by Menezes.⁷ Due to hypermobility of the spine at the fulcrum of neck motion with low inertia children are prone to hyperflexion/hyperextension injury in comparison to adults. On reviewing the literature, REDH was associated with atlanto occipital dislocation in five reported cases, unilateral occipital condyle fracture in two cases, bilateral occipital condyle fracture in one case, clival fracture in two cases and odontoid fracture in one case.^{3,5,6,8,9} In the literature associated AAD have been reported only in two cases of REDH and we are reporting the third one.^{4,8} In children skull base fracture or ligamental injury due to direct trauma leads to dural stripping and causes extradural haematoma. Sometimes it is difficult to differentiate between a retroclival extradural & subdural hematoma. The main difference between a REDH and retro-clival subdural hematoma is that, in epidural hematoma the venous sinus bleeding dissect inferiorly upto attachment of tectorial membrane to the body of C2 vertebrae without any further downward descent whereas in subdural hematoma, it can go even down beyond C2 (Fig. 4). This occurs due to continuity of posterior (inner) layer of clival dura with spinal dura while the anterior (periosteal) layer is continuous with the tectorial membrane, the upward extension of posterior longitudinal ligament.¹⁰ There is actually no correlation between the size of hematoma and presenting symptom of the patient.² Patient may have various clinical presentations including cranial nerve involvement (most commonly abducens nerve) hemiparesis,

paraparesis and quadriplegia.^{1,2} This may be due to compression by hematoma on cranial nerve or brainstem. CT scan may show a hyperdense lesion just posterior to the clivus which was present in our case or initially CT scan may appear apparently normal. MRI is essential to detect the finer anatomical details of the REDH which appear as hyperintense lesion on T1W and T2W sequence. Tectorial membrane tear is the most likely causative factor for REDH occurrence. On MRI it may be represented by a loss of tectorial membrane continuity or stretching and detachment of membrane which was also present in our case.⁵ Conservative management with cervical immobilization and regular assured follow-up is best management option in absence of progressive neurological deterioration. Surgery in form of evacuation of hematoma and cervical spine stabilization may be required in existing compression of the brainstem or instability of the craniovertebral junction. In reported cases surgery was required in only four cases, two with transoral evacuation^{4,8} and two with posterior decompression.⁶ Rest all cases was managed conservatively. In all reported cases of REDH five had fatal outcome. Four patients had very poor GCS score (3-5) at the time of admission. One patient with odontoid fracture and GCS score 15 had sudden cardiopulmonary arrest without previous neurological symptoms.^{2,3,8,9} Thirty three patients had good recovery and only five patients had partial recovery on treatment. Our case was also managed conservatively with good recovery.

4. Conclusion

Post traumatic REDH is a rare entity, which should be suspected in high speed motor vehicle accident especially in

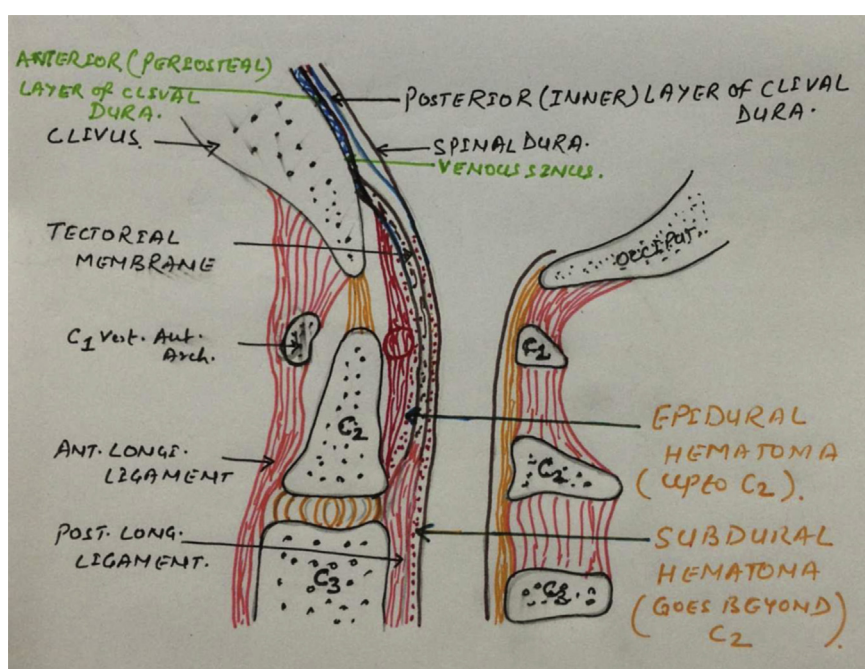


Fig. 4 – Line diagram showing the difference between descent of REDH (upto C2 level) and retroclival subdural hematoma (beyond C2 level) due to continuity of anterior (periosteal) dura with tectorial membrane and posterior clival dura with spinal dura.

pediatric age group. On suspicion of REDH, MRI should be done as REDH is usually underdiagnosed on initial CT scan of head. Atlantoaxial and atlanto-occipital dislocation should be kept in mind during evaluation and to be ruled out. In majority of cases conservative management is treatment of choice with excellent outcome and prognosis.

Conflicts of interest

All authors have none to declare.

Acknowledgment

I would like to thank Dr. Rajsi Jain for her contribution in helping me with the editing and preparing of this manuscript.

REFERENCES

1. Ratilal B, Castanho P, Vara luiz C, Autunes JO. Traumatic clivus epidural hematomas: case report and review of the literature. *Surg Neurol*. 2006;66:200–202.
2. Tubbs RS, Griessenauer CJ, Hankinson T, et al. Retroclival epidural hematomas: a clinical series. *Neurosurgery*. 2010;67:404–407.
3. Orrison WW, Rogde S, Kinard RE, et al. Clivus epidural hematoma: a case report. *Neurosurgery*. 1986;18:194–196.
4. Marks SM, Paramaraswaren RN, Johnston RA. Transoral evacuation of a clivus extradural haematoma with good recovery: a case report. *Br J Neurosurg*. 1997;11:245–247.
5. Meoded A, Singhi S, Poretti A, Eran A, Tekes A, Huisman TAGM. Tectorial membrane injury: frequently overlooked in paediatric traumatic head injury. *Am J Neuroradiol*. 2011;32:1806–1811.
6. Papadopoulos SM, Dickman CA, Sonntag VKH, Rekeate HL, Spetzler RF. Traumatic atlanto occipital dislocation with survival. *Neurosurgery*. 1991;28:574–579.
7. Menezes AH. *Developmental Abnormalities of the Craniovertebral Junction*. In: Youman's Neurological Surgery. 5 ed. Philadelphia: WB saunders; 2003:3331–3346.
8. Kwon TH, Joy H, Park YK, Chung HS. Traumatic retroclival epidural hematoma in a child: case report. *Neurol Med Chir (Tokyo)*. 2008;48:347–350.
9. Bovet JP, Armengol RG, Ferrer SM. Traumatic epidural retroclival hematoma with odontoid fracture and cardiorespiratory arrest. *Spinal Cord*. 2013;51:926–928.
10. Krishnan P, Kartikueyan R, Chowdhury SR, Das S. Retroclival subdural hematoma: an uncommon site of a common pathology. *Neurol India*. 2013;61:550–552.