Case Report

Retroclival and spinal subdural hematoma after traumatic brain injury - A case report and literature review

Saúl Solorio-Pineda1, Adriana Ailed Nieves-Valerdi1, José Alfonso Franco-Jiménez1, Guillermo Axayacalt Gutiérrez-Aceves1,2,3, Luis Manuel Buenrostro-Torres1, Milton Inocencio Ruíz-Flores1

1Department of Neurosurgery, Centro Médico "Lic. Adolfo López Mateos", ISEM. Av Nicolás San Juan S/N, Colonia ex-Hacienda la Magdalena, Toluca, Estado de México, México; 2Radioneurosurgery Unit, Neurological Center, Department of Neurosurgery, National Institute of Neurology and Neurosurgery "Dr. Manuel Velasco Suarez", Av. Insurgentes Sur No. 3877, La Fama, 3American British Cowry Medical Center, Carlos Graef Fernández No. 154, Col. Santa Fe, Cuajimalpa, México City, México.

E-mail: Saúl Solorio-Pineda - solorio_capricornio@hotmail.com; Adriana Ailed Nieves-Valerdi - soda_stereo300@hotmail.com; José Alfonso Franco-Jiménez - franco-doc@hotmail.com; Guillermo Axayacalt Gutiérrez-Aceves - neuroaxa@gmail.com; Luis Manuel Buenrostro-Torres - lumabuentor@hotmail.com; Milton Inocencio Ruiz-Flores - mdruizmilton79@yahoo.com.mx

ABSTRACT

Background: Retroclival hematomas are rare and occur mostly in the pediatric population. They are variously attributed to trauma, apoplexy, and vascular lesions. With motor vehicle accidents (MVAs), the mechanism of traumatic injury is forced flexion and extension. There may also be associated cervical spinal and/or clivus fractures warranting fusion.

Case Description: A 35-year-old male sustained a traumatic brain injury after a fall of 5 m at work. His Glasgow coma scale (GCS) on admission was 13 (M6V3O4). He had no cranial nerve deficits. The brain computed tomography (CT) showed a retroclival subdural hematoma that extended to the C2 level.

Conclusions: Most retroclival hematomas are attributed to MVAs, and cranial CT and magnetic resonance studies typically demonstrate a combination of posterior fossa hemorrhage with retroclival hematomas (intra or extradural). Patients with retroclival hematomas but high GCS scores on admission usually have better prognoses following traumatic brain injuries attributed to MVA. Notable however is the frequent association with additional cervical and/or craniocervical injuries (e.g. such as odontoid fracture) that may warrant surgery/fusion.

Keywords: Retroclival hematoma, subdural hematoma, traumatic brain injury

INTRODUCTION

Retroclival hematomas are rare, occurring mostly in the pediatric age group. They are variously attributed trauma (motor vehicle accidents [MVAs] and forced flexion/extension injuries), apoplexy, vascular lesions, and anticoagulants. They are typically classified as epidural or subdural and are often associated with cervical spine and/or clivus fractures. Many patients present with sixth cranial nerve palsies that typically recover. Rarely, patients require posterior fossa decompression, cervical fusion, and/or occipitocervical
## Table 1: Comparative table of traumatic cases with retroclival hematomas.

| Authors          | Year | Age | Sex  | Mechanism          | Neurological findings                                           | Epidural/subdural | Vascular injuries | Associated injuries                             | Follow-up          | Treatment                                                                 |
|------------------|------|-----|------|---------------------|------------------------------------------------------------------|-------------------|-------------------|-------------------------------------------------|-------------------|----------------------------------------------------------------------------|
| Fuentes          | 2000 | 47  | Female | MVA                | Tetraparete; Left abducens paralysis                            | Epidural          | NA                | Bilateral occipital condyle fracture             | GR                | Suboccipital craniectomy and laminectomy C1                                  |
| Khan             | 2000 | 19  | Male  | MVA                | Tetraparete; Right III, bilateral VI, right VII, palsy          | Epidural          | NA                | Clivus fracture                                  | GR                | Conservative treatment                                                        |
| Ratilal          | 2006 | 26  | Female | MVA                | Bilateral VI palsy; Bilateral V paresthesias; Left XII palsy    | Epidural          | NA                | Right transverse process of C6                  | GR                | Conservative treatment                                                        |
| Casey et al.     | 2009 | 18  | Male  | Assaulted          | GCS 13, no focal deficits                                       | Subdural to C2    | NA                | None                                            | GR                | Conservative treatment                                                        |
| Garton et al.    | 2010 | 38  | Female | MVA                | GCS 15, Right VI palsy                                          | Epidual           | NA                | Bilateral occipital condyle fracture             | GR                | Occipitocervical fusion to C2                                                 |
| Sridhar et al.   | 2010 | 18  | Male  | MVA two-wheeler    | GCS 8; mild right hemiparesis. Right VI palsy                   | Epidual           | No                | Subluxation C1–C2 and C5–C6                    | GR                | Occipitocervical fusion to C2                                                 |
| Ayberk           | 2011 | 47  | Female | Fall from a moving bus | Headache and neck pain                                        | Subdural to C1    | Subdural to C1 | None                                            | GR                | Conservative treatment                                                        |
| Pérez-Bovet      | 2013 | 68  | Male  | MVA                | GCS 15 at first and then a cardiac arrest                       | Epidual           | NA                | Sphenoid sinus fracture                         | GR                | Drainage of right frontoparietal epidural hematoma                           |
| Datar et al.     | 2013 | 75  | Male  | Tripped on rug     | Normal                                                          | Subdural to C7    | NA                | Odontoid fracture                                | Dead              | Posterior fusion                                                              |
| Nguyen et al.    | 2017 | 32  | Female | MVA                | GCS 15                                                           | Subdural to C7    | No                | CI fracture                                     | GR                | Suboccipital craniectomy, C1–C3 laminectomy, and occipitocervical fusion.   |
| Izumida and Ogura| 2017 | 64  | Male  | Sincope            | Normal                                                          | Epidural          | No                | None                                            | GR                | Conservative treatment                                                        |
| Present case     | 2018 | 35  | Male  | Fall from 5 m      | GCS 13, cranial nerves normal                                   | Subdural to C2    | No                | Left wrist fracture                             | GR                | Conservative treatment                                                        |

MVA: Motor vehicle accident, GR: Good recovery, NA: Not available, GCS: Glasgow coma scale
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fusion (e.g., if an odontoid fracture is also present). Here, we present a 35-year-old male who did well following a traumatic brain injury, resulting in a retroclival hematoma extending to the C2 level that did not warrant surgical intervention.

**CLINICAL CASE**

A 35-year-old male sustained a traumatic brain injury (Glasgow coma scale [GCS] of 13) following a fall of 5 m. On admission, he was delirious and had bilateral pupils measuring 3 mm without attendant cranial nerves palsies. The skull X-ray showed a non-displaced right frontotemporal fracture and fractures of the right orbital floor, lateral wall/roof, and nasal bones. The brain computed tomography (CT) documented a posttraumatic subarachnoid hemorrhage, right frontal subdural hematoma, and retroclival subdural hematoma extending to the C2 level with partial collapse of the infratentorial cisterns [Figures 1-3]. There was also a left mandibular ramus fracture, plus a distal metaphyseal fracture of the left wrist; none of these warranted operative intervention.

Following a hospital stay of 11 days, the patient fully recovered (i.e., GCS of 15 points [M6V5O4]) and exhibited no residual neurological deficits. Further, he remained intact 12 months later.

**DISCUSSION**

Most retroclival hematomas are attributed to MVAs and generally carry a good prognosis [Table 1]. A significant subset will exhibit attendant cervical spine and/or occipitocervical injuries with vertebral instability that may warrant fusion. Most cases can be treated conservatively. Garton et al. reported four cases of retroclival hematomas in patients exhibiting sixth cranial nerve paralysis. Diagnostic studies for retroclival hematomas include magnetic resonance (MR) and CT evaluations to best document the extent of posterior fossa hemorrhage and intra- or extra-dural retroclival hematoma, along with craniovertebral ligament injuries, clot migration, and/or occipitocervical fractures.

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**Figure 1:** Axial computed tomography scan with subdural hematoma (red arrows). (a) Odontoid level, (b) bulbar level, (c) mesencephalic level.

**Figure 2:** Computed tomography scan with subdural hematoma (white arrows). (a) Sagittal, (b) coronal.
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In the case presented, the patient had no cranial nerve palsies and required no surgery despite CT-documented posttraumatic subarachnoid hemorrhage, a right frontal subdural hematoma, a retroclival subdural hematoma extending to the C2 level, and partial collapse of the infratentorial cisterns. Notably, he was fully intact on discharge 11 days later.

CONCLUSIONS

Retroclival hematomas are rare in adults. These patients should undergo both CT and MR studies to document the location/extent of these hematomas along with other cranial/cervical pathology (e.g., hematomas, fractures, and ligamentous injuries). The majority of patients do well without surgical intervention; only a few warrant posterior fossa decompression for clot evacuation with/without cervical and/or craniocervical fusion.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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