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Air in acute Extradural Hematoma: management and outcome analysis

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Abstract: Extradural hematoma with air bubbles has been described in literature. However the significance of it needs special attention with respect to prognosis. We report five case of extradural hematoma with air bubble and its management along with pertinent literature is reviewed briefly.

Key words: Head injury, extradural hematoma, pneumocephalus, management

Introduction

Air in epidural hematoma is increasingly picked with the greater availability of newer generation computerized tomography for head injury patients. 1-5 However, its presence was previously evaluated by several authors, 4, 6-8 but the real significance of air inside the acute extradural hematoma was first clinically evaluated by Aoki et al 1. However, there is paucity of literature in the western literature. 2, 3, 5 Authors reviewed the computed tomography scan of 300 cases, who were operated at our institute, however, only five cases of extradural hematoma having air bubbles met the criteria. Only those cases were selected, who sustained closed head injury but the overlying scalp adjacent to fracture and extradural hematoma did not have scalp laceration or open compound fracture.

Case illustration

Illustrated Case - 1

A-26-year-old male reported to our neurosurgical emergency after sustaining road traffic accident. He presented with headache with history of loss of consciousness. He had scalp contusion over parieto-occipital region on both side, more on right side. Urgent computerized tomography revealed hematoma in the left temporo-occipital region having mixed attenuation density suggestive of actively forming extradural dermatome and containing gas bubbles. (Figure 1), while left sided EDH contained air bubble with underlying fracture of left temporo-occipital region bone extension into the posterior fossa. (Figure 2), there was also fracture extending across the left mastoid bone. He underwent evacuation of extradural hematoma. He was doing well after two- years following surgery at the last follow-up.

Figure 1 - Non-contrast Computerized tomography scan head revealed bilateral temporooccipital extradural hematoma. Extradural hematoma over the left temporo-occipital region having mixed attenuation density, suggestive of actively forming extradural dermatome and containing gas bubbles while left sided EDH contained air bubble

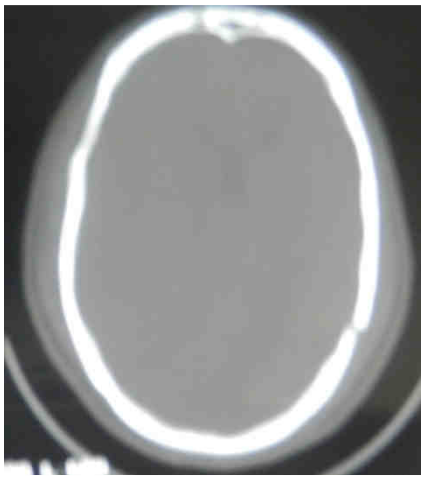

Figure 2 - The cranial Computerized tomography scan, bone window view revealed bilateral temporooccipital extradural hematoma while left sided EDH contained air bubble and underlying fracture involving left temporal – squamus with extension into left mastoid sinus

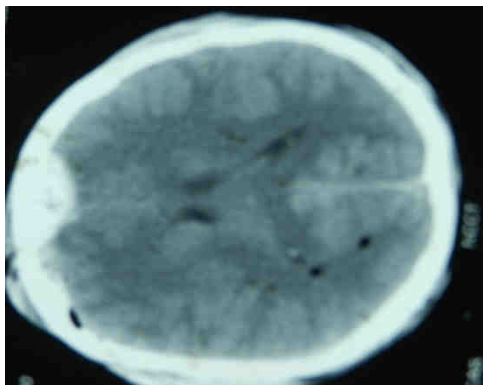

Figure 3 - Non-contrast Computerized tomography scan head revealed bifrontal extradural hematoma with air aerocele over extradural hematoma spread over right basifrontal region

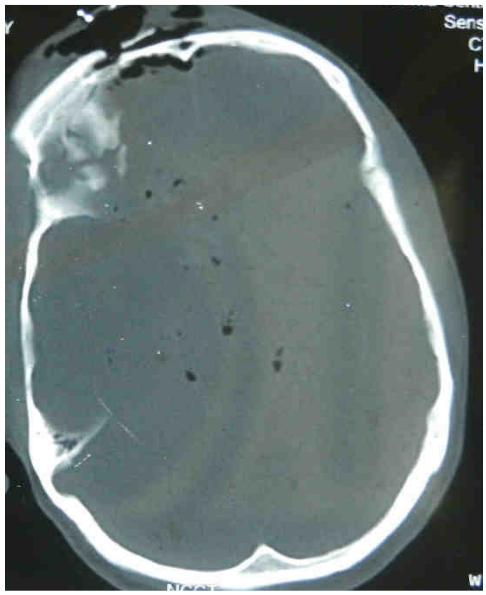

Figure 4 - the cranial Computerized tomography scan, bone window revealed fracture of orbital roof and ethmoid sinus with intracranial air pockets in cisterns

Illustrated Case -2

A-16 year school going student had history of injury following assault by hit by colleagues in the playground. He had headache and

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right ear otorrhoea. He was confused but rest of neurological examination was normal. The plain X-ray skull revealed linear fracture of right temporal bone. The cranial CT scan revealed acute extradural hematoma in the right temporal region with air bubbles. The bone window revealed linear skull fracture traversing the right mastoid bone. He underwent evacuation of extradural hematoma. The bleeding was through middle meningeal artery, which was coagulated during surgery.

Illustrated Case - 3

An 18 –year old boy with history of fall from height about seven hours ago reported tour hospital. He was comatose and decrebrating. Both pupil were dilated and none reacting to light. The Cranial CT scan revealed right frontal extradural hematoma with air pocket. (Figure 3) The .right frontal skull fracture was extending to the ethmoid sinus. (Figure 4) During surgery extradural hematoma was evacuated. He needed prolonged ventilatory support .Later tracheostomy was required. He awes discharged 2 months later with tracheostomy tube and cerebrating motor response.

Illustrated Case - 4

A-10 year –old –boy was brought to our neurosurgical emergency after being run over by motor bike. He had headache and repeated episodes of vomiting with fracture of shaft of right femur. His neurological examination was normal. A thin extradural hematoma with air in extradural space was noted over right frontotemporal region, the fracture was involving right mastoid sinus. The source of bleeding middle meningeal artery, which was coagulated intraoperatively. He underwent Intramedullary nailing for the fracture femur. He was doing well one year after surgery.

Illustrated Case - 5

A-30-old farmer presented to hospital 3 hours following hit by ox. On admission he was comatose with localizing to painful stimuli with history of aspiration of vomitus. He was immediately intubated in causality the right pupil was dilated with sluggish reaction to light. A cephalhematoma was present over right fronto parietal region. He was operated on after detection of right frontoparietal extradural hematoma. Cranial CT scan displayed acuter extradural dermatome having mixed attenuation density suggestive of actively forming extradural dermatome with gas bubbles. The right basifronatal cortex showed contusion. The bone window CT scan revealed fracture of ethmoid sinus. He was neurologically normal without any CSF rhinorrhoea.

TABLE 1

Summary of five cases with extradural haematoma containing air bubbles

Case no.	Age(years) / sex	Mode of head injury	Origin of air	Infective /suppurative complications
1	26 M	Road traffic accident	Mastoid sinus	None
2	16 M	Blow to head	Ethmoid sinus	None
3	18 M	Fall	Mastoid sinus	None
4	10 M	Road traffic accident	Mastoid sinus	None
5	30 M	Blow to head	Ethmoid sinus	none

Discussion

Extradural hematoma associated with gas bubbles is well known even prior to advent of CT scan. Suwanwela et al (8) described extradural aerocele in 1962. Even the 20 year long follow-up result of case, which was initially described by Suwanwela et al (8) of extradural hematoma with pneumocephalus was reported by Alexander et al (4) advocated the effectiveness of surgical closure of the fistula. Nova et al in 1984 indicated that presence of black dot in hematoma indicated the role of localization of hematoma in the extradural space. Air in acute extradural hematoma was increasingly picked with the advent of newer generation CT scan. The exact incidence is unknown, Cossu et al. (5) retrospectively analyzed the actual incidence of gas bubble on CT scan was in 22.5 to 37 % cases, depending on older generation or current generation CT scanner were utilized, recent advanced generation scan being more sensitive in picking – up air pocket and minimizing beam hardening effect after analyzing 204 surgically verified extradural hematoma. Shuto et al (2) reported incidence of air bubble in extradural hematoma up to 34.6 % in their study involving 78 cases, further also concluded that there was no statically difference in overall outcome or increase in the risk of enlargement of size of haematoma among the acute extradural haematoma with and a without air pocket as content. Akoi was credited for first one, who stressed the significance air in the acute extradural hematoma and also pointed out the possibility of contamination of extradural hematoma leading to increased infection and also possible increase in mass effect subsequent to enlarging total volume of hematoma along with mixed air. However, Aoki al observed an increase in volume of extradural hematoma in one of his case, which was diagnosed to have air pocket in the extradural hematoma, on repeat CT scan. Regarding the possible contamination of extradural space and associated infection, there was no incidence of infective

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complication in our series as well as those of reported cases in the literature. (2, 3, 5-7) However, one of the cases of Suwanwela et al (8) having extradural aerocele with CSF fistula developed meningitis.

Regarding the origin of gas trapped in the extradural hematoma may take entrance into hematoma either from the paranasal sinus, or mastoid sinus or direct overlying fracture of skull bone. Nova et al (7) suggested that the gas trapped in an extradural hematoma is not related to the fracture of sinus, since air is collected in place which is away from the paranasal sinus or mastoid. But mastoid was implicated for the source of air from mastoid cell. (1, 9) Shuto et al (2) observed in study of 27 cases the possible source of air was mastoid sinus (n=13), open compound fracture (n=5) and three cases each from following sources i.e. frontal sinus, sphenoid sinus, and unknown source. However, Cossu et al (5) concluded that available data failed to clearly delineate the source of gas bubble. In present series, out of a total of 5 cases, three had fracture which was extending up to mastoid sinus while rest two had fracture involving ethmoid sinus. The presence of air in the epidural hematoma in case of closed head injury incites its probable location in the extradural space. However according to current literature, air in extradural hematoma is not associated with increased risk of infective complications, abscess formation or associated morbidity. Further there is no possibility of increased incidence of raised mass effect caused by presence of air. However, relatively small sample of present study is limitation, however, a large study is needed to clearly establish or evaluate the exact role of air in the EDH, in possibly increased risk of contamination, infection and contribution to the raised intracranial pressure or mass effect.

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References

1.Akoi N. Air in acute extradural hematoma. Report of two cases. J Neurosurg 1986; 65: 555-556.
2.Shuto T, Kitsuto Y, Yoshida T, Suzuki N, Sugiyama M, Yamamoto I. Clinical study on air in epidural hematomas. No To Shinkei 1997; 49; 977-981.
3.Tewari MK, Bhatoes HS, Thakur RC, Kak VK, Khandelwal N. Air in epidural hematoma. 1992; 36: 122-128.
4. Alexander E Jr, Davis CH JR, Suwanwela C. Extradural aerocele case report with 20- year follow-up results. J Neurosurg 1982; 56: 296-298.
5. Cossu M, Arcuri T, Cagetti B, bas M, Siccardi D, Pau A. Gas bubbles within acute intracranial epidural hamatomas. Acta Neurochir (Wien) 1990; 102:22-24.
6. Rahimiadeh A, Hadadian K. Acute extradural hematoma and pneumocephalus. Neurosurg 1984; 15: 278-279.
7 Nova HR. Air in epidural hematoma. J Neurosurg 1984, 60: 879 (letter)
8. Suwanwela C, Alexander E Jr, Davis CH Jr. Extradural aerocele. J Neurosurg 1962; 19:401-404.
9. St John, French BN, Traumatic hematomas of posterior fossa. A clinicopathological spectrum. Surg Neurol 1986; 25: 457- 466.
10. Ersahin Y, Mutluer S Air in acute extradural hematomas: Report of six cases. Surg Neurol 1993; 40: 47 -50.