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Delayed post traumatic CSF rhinorrhoea. Two rare cases and review of literature

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ABSTRACT

Cerebrospinal fluid (CSF) leak can occur immediately or several years after traumatic skull base injury which may present merely as a CSF leak or may even present with recurrent meningitis. Around 2% of all cases of head trauma, and 12%–30% of all basilar skull fractures may develop CSF leak. Posttraumatic CSF rhinorrhoea usually occurs within the first 48 hours, and the majority of them occur in the first 3 months, whereas delayed CSF leak beyond 3 months is rare.

We encountered two such cases of delayed post-traumatic CSF rhinorrhoea about a decade after the head injury. We have reviewed and discussed previous studies on delayed post-traumatic CSF rhinorrhoea which have shown CSF leaks occur after months, years, or even after trauma. Such cases may help clinicians to be aware of the possibility of delayed CSF rhinorrhoea which may occur years after traumatic head injury.

INTRODUCTION

Cerebrospinal fluid (CSF) leak is not an unknown entity after traumatic brain injury (TBI). Around 2% of all cases of head trauma, and 12%–30% of all basilar skull fractures may develop CSF leak. In two third of patients, post-traumatic CSF rhinorrhea usually occurs in first 48 hours whereas majority of them occur in the first 3 months. The delayed CSF leak that occurs beyond 3 months is rare but not un-common. However delayed post-traumatic CSF rhinorrhoea have been reported to occur even decades after TBI. Such patients after detail evaluation found to have CSF leak for the cause of recurrent meningitis. [1,2]The following report describes two such cases of delayed CSF rhinorrhoea about a decade after TBI.

CASE REPORT

Case 1

A 26 years old young male with no known history of Asthma, Tuberculosis or allergic rhinitis was referred to us for treatment of watery discharge from right nostril which was there for 2 years. The

Keywords
cerebrospinal fluid (CSF),
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rhinorrhoea,
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watery discharge used to exacerbate on lying supine and on sitting position. The leak was intermittent in nature, clear non sticky, non blood stained, no history of headache, fever and vomiting and neck rigidity. The patient had not undergone any previous surgery and was not on any medications. He had fall from height (10 feet) and had sustained head injury 2 years ago. Patient subsequently had nose bleeding but patient could not recollect whether blood was mixed with any watery discharge or not. There was no history of loss of consciousness or seizure or vomiting. He did not seek medical advice following the incident and had no documents regarding the same. General examination was unremarkable. However, patient had anosmia with no other neurological deficits.

CSF rhinorrhea was also evident on clinical examination. Routine hematological and biochemical profile was normal. Well demarcated bone defect in the floor of the anterior cranial fossa into posterior wall of frontal air sinus with invaginated bone with everted margins on right side was evident on CT Head (Fig 1). Similar defect with herniation of thin gliotic tissue in the right frontal air sinus with CSF collection was revealed on MRI (Fig 2). Hence a diagnosis of post traumatic CSF rhinorrhoea with defect in the anterior cranial fossa (ACF) base at frontal air sinus probably due to growing fracture was made based on clinical and radiological findings.

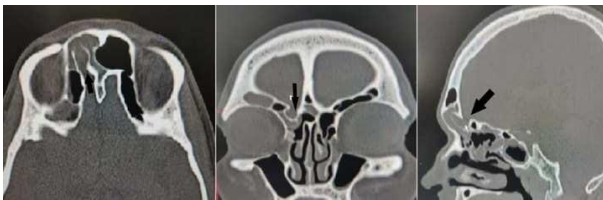


Figure 1. Demarcated bone defect in the floor of the anterior cranial fossa into posterior wall of frontal air sinus (Arrows).

A bifrontal craniotomy and intradural-extradural repair of CSF fistula was done. On retracting the right frontal lobe, a thin gliotic tissue and arachnoid was seen going through the bone defect with evidence of bony invagination into frontal air sinus on right side (Fig 3). As gliotic tissue and arachnoid was resected, bone defect of 4.4 X 5 mm was found. Frontal air sinus was exteriorized and packed with gelfoam soaked in betadine solution and galea tissue. The bony defect was sealed with a bone graft harvested from inner table of frontal bone. The base of ACF was

covered with fascia pericranium tissue. Postoperative period was uneventful and patient had no leak in follow up.

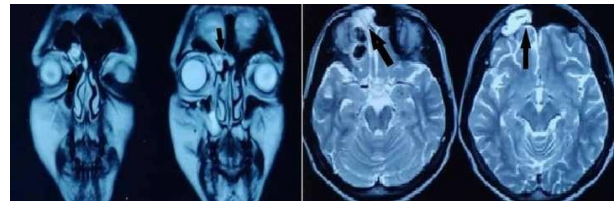


Figure 2. MRI showing defect with herniation of thin gliotic tissue in the right frontal air sinus with CSF collection (arrows).



Figure 3. Intra-operative view showing gliotic tissue herniating through the bony defect (arrows).

Case 2

A 30 years old young female was referred to us with watery discharge from left nostril for last 4 years. The leak was exacerbated on sitting, was intermittent in nature, clear non sticky, not blood stained. Patient has history of being treated for meningitis episode 4 years back after which she developed CSF leak. Patient is not a known case of asthma or allergic rhinitis, had not undergone any previous surgery. She had sustained head injury at age of 19 years due to fall from height following which was managed conservatively in view of grossly normal CT brain findings. There was no history of CSF leak during the last 4 years. General examination revealed two scars on forehead. She had anosmia on left side with no other neurological deficit.

The routine blood investigations were normal. CT Head revealed a well demarcated bone defect in the floor of the anterior cranial fossa involving the cribriform plate on left side (Fig 4A). MRI brain revealed the same along with herniation of gliotic brain tissue with CSF collection (Fig 4B and 4C). Hence diagnosis of post traumatic CSF rhinorrhoea with defect in the anterior cranial fossa (ACF) base at left cribriform plate was made based on clinical and radiological findings.

A bifrontal craniotomy and repair of defect with sub-frontal intra and extradural approach was performed as in previous case. Postoperative period

was un-eventful and patient had no further leak in subsequent follow up.

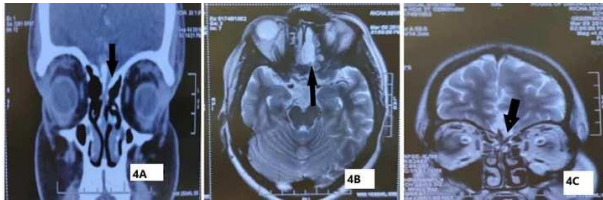


Figure 4. CT Head revealed a well demarcated bone defect in the floor of the anterior cranial fossa involving the cribriform plate on left side (Fig 4A). MRI of brain revealed.

DISCUSSION

A total of 19 cases of delayed posttraumatic CSF rhinorrhea including the present cases are described in Table 1. CSF leaks commonly occurs following nonsurgical trauma (80%–90% of cases), 16% occurs due to surgical procedures and the remaining 4% are non-traumatic. It is also evident in 12%–30% of all basilar skull fractures.[1] CSF leak has 10% risk of developing meningitis per year.[1,2] Traumatic CSF rhinorrhea has been classified into immediate that occurs within 48 hours and delayed CSF rhinorrhea.

Literature has shown that 50% of traumatic CSF rhinorrhea occurred in first 48 hours and almost all of them present in first 3 months. The delayed CSF leaks that are occurs beyond 3 months are seen in the 5% of patients whereas CSF leak beyond a year is very rare. [3,4,5,6,7,8,9,10] However leaks occurring up to a prolonged period of 44 years has been reported in literature.[14] Generally post traumatic CSF leak subsides spontaneously. These happens either due to sealing by blood clot or, inflammation, or due to brain tissue herniation. The natural healing that occurs as per above mentioned mechanisms are not perfect and hence patients may present again with CSF leak in few month time. The re-leak may be due to resolution of edema or, due to resolution of inflammation or due to absorption of blood clot resulting into reopening of bony defect. If CSF leak does not occur within months of TBI, the incidents are often forgotten till patients get recurrent meningitis or CSF leak at later date.

The possible mechanisms for re-leak may be raised intracranial pressure, another trauma, growing skull fracture (frontal/ ethmoid), necrosis of scar and bone or due to craniofacial remodeling with advancing age and ascending infections. CSF leak usually occurs through dural tearing and associated

fracture of anterior cranial fossa involving cribriform plate and posterior wall of the frontal sinus and sphenoid sinus [3,4,5,6,7,8,9,10,11,12,13,14,15,16].

Table 1

Cases of delay post traumatic cerebrospinal fluid leak

Author (Year)	Age	Trauma	Interval from trauma to CSF leak in years	Meningitis	Operative approach
Linell and Robinson (1941) ^[1]	-	Unknown	14	Yes	Unknown
Schneider and Thompson (1937) ^[4]	37	Traffic	Unknown	Yes	Unknown
Uemura and Makino (1978) ^[7]	33	Gun shot	9	Yes	Unknown
Kamerer and Caparosa (1981) ^[6]	-	Unknown	17	-	Unknown
Merelli et al., 1982 ^[3]	35	Traffic accident	12	No	Intradural
Russell and Cummins (1984) ^[5]	43	Falling down	34	No	Intradural
Okada et al., 1991 ^[8]	44	Traffic accident	13	Yes	Intradural
Pandya and Keogh (1991) ^[9]	52	Head trauma	30	Yes	Intradural
Pandya and Keogh (1991) ^[9]	58	Traffic accident	35	Yes	Unknown
Stewart and kaye (1992) ^[11]	38	Traffic accident	14	Yes	Intradural
Crawford et al., 1994 (12)	40	Traffic accident	35	Yes	Unknown
Salca and Danaila (1997) ^[13]	54	Traffic accident	27	No	Extradural
Rao et al., 2010 ^[14]	57	Falling down	44	No	Intradural
Kamochi et al., 2013 ^[15]	66	Traffic accident	20	Yes	Intradural
Guyer and Turner (2015) ^[16]	62	Traffic accident	5	No	Intradural
Guyer and Turner (2015) ^[16]	61	Traffic accident	12	No	Intradural
Case 1	26	Fall from height	12	No	Intradural Extradural
Case 2	30	Fall from height	07	Yes	Intradural Extradural

Table 1. Reported cases of delayed post traumatic CSF rhinorrhea.

CONCLUSION

Delayed post traumatic csf rhinorrhoea although rare but are not unreported complications of traumatic injuries involving the skull base. A high index of suspicion in cases of spontaneous csf leaks or recurrent meningitis with history of remote head trauma can lead to adequate diagnosis & timely management.

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