LATERAL SINUS THROMBOSIS:

A major problem still with us

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Abstract: Twelve cases of lateral sinus thrombosis, which occurred as a complication of attico antral type of chronic otitis media, are reported. Management includes broad spectrum intravenous antibiotics and surgery. Radical mastoidectomy with incision of the lateral sinus and removal of its content was done for all cases. There were no deaths. The prognosis of lateral sinus thrombosis is good if treatment is instituted early with broad-spectrum antibiotics and surgery.

Keywords: Lateral sinus thrombosis, Radical mastoidectomy, Thrombus

INTRODUCTION

Lateral sinus thrombosis is now a rare complication of otitis media¹. The incidence of lateral sinus thrombosis during the course of ear infection was a very well known complication in the pre antibiotic days^{1,2}. The decrease in incidence of lateral sinus thrombosis is due to early antibiotic therapy during initial otitis and mastoiditis^{1,3,4,5}. The classical picture is often modified because of previous antibiotic therapy making the diagnosis of the occasional case of lateral sinus thrombosis more difficult by altering the expected clinical course^{1,2,6}.

The remarkable decrease in incidence of this complication has gradually reduced the suspicion and hence the diagnosis of lateral sinus thrombosis. Otologists should, however, realise that this complication will be encountered occasionally and must be managed properly².

OBJECTIVES

To review clinical signs and symptoms, bacteriology, management and outcome of patients treated for lateral sinus thrombosis.

MATERIALS AND METHODS:

This study was undertaken on patients who were admitted for intracranial complications of otitis media from 1999 to 2005.

DIAGNOSIS AND PATIENT SELECTION

Patients were diagnosed on the basis of clinical history, examination, and investigations including haemogram, ear pus culture and sensitivity, CT scan of head and brain/MRI-plain and contrast studies. Only cases with surgically and radiologically proven lateral sinus thrombosis cases were included in this study.

TREATMENT

I) Medical

(a) Intravenous antibiotics

Cephalosporins - Cefotaxime, Ceftriaxone

Penicillins - Crystalline penicillin, Ampicillin

Amino glycosides - Gentamycin/Amicacin

Imidazole derivatives - Metranidazole

(b) Steroids (dexamethasone) and manitol (10%) for reducing brain oedema

II) Surgical

Radical mastoidectomy with incision of lateral sinus and removal of its contents.

RESULTS:

Demographics (Table I)

In this study period there were twelve cases of lateral sinus thrombosis. There were nine male patients and three female patients. Ten cases were from rural area and two cases were from urban area. Patient's age ranged from eight to thirty eight years. All patients had treatment with antibiotics elsewhere prior to the admission. The duration of symptoms preceding admission ranged from three to eighteen days.

Symptoms (Table II)

Ear discharge and ear pain were present in all cases. Fever was present in eleven patients and headache in ten patients. Other symptoms were vomiting, swelling in the mastoid region and pain in the neck.

Otological findings (Table III)

Right lateral sinus was involved in seven cases and left lateral sinus was involved in five cases. Foul smelling ear discharge, attic/marginal perforation and Cholesteatoma was present in all the cases. Granulations were present in the ear canal in five cases. Two patients had sagging of posterior canal wall and two patients had post-aural fistula.

INVESTIGATIONS

No patients were anaemic. Ear culture was positive in ten cases. The most common organisms were pseudomonas and proteus species. Other organisms isolated were staphylococcus species. In eight cases culture showed mixed infection. In two cases infection was with single organism. Blood culture was negative in all the cases. CTscan was done in all patients and "delta sign"

Fig 1 : CT scan showing (arrow) drained cerebellar abscess.

Fig 2 : MRI scan showing (arrow) post contrast enhancement of the sinus wall on the left side.

Fig 3 : MRI scan showing (arrow) post contrast enhancement of the sinus wall on the left side.

was demonstrated in five cases. MRI with contrast study was done in seven patients and it showed thrombus in all seven cases.

TREATMENT:

Intravenous broad-spectrum antibiotics were used in all patients. All patients underwent radical mastoidectomy with incision of lateral sinus wall and removal of its content. Even after removal of contents there was no fresh bleeding from the sinus in seven cases. Only lateral sinus thrombosis was found in four cases. Lateral sinus thrombosis with perisinus abscess was present in five cases. Two patients had post aural fistula. One patient had cerebellar abscess, meningitis with lateral sinus thrombosis (Table IV). Abscess was drained by neurosurgeon and patient was referred to ENT department for the management of lateral sinus thrombosis (figure 1). There were no postoperative complications. There were no deaths in this series (Table V). The total number of hospital stay ranged from fifteen to twenty seven days.

DISCUSSION:

Lateral sinus thrombosis is potentially fatal condition in which early diagnosis may be difficult because of previous antibiotic therapy^{1,6,7}. Although antibiotics have generally reduced the incidence of lateral sinus thrombosis, they have not reduced the mortality rate^{5,8}. In the era of antibiotics, the presentation of lateral sinus thrombosis has changed from pronounced signs and symptoms to vague and non-specific symptoms. The decreased incidence and change in presentation requires clinician to maintain a high index of suspicion to make the diagnosis³. Lane performed the first successful surgery for lateral sinus thrombosis in 1888. Until then the mortality for this complication has been 100%. Operative intervention reduced the mortality to 50%. Between 1932 and 1940 when antibiotics were introduced, a combination of antibiotics and surgical management reduced the mortality rate to 25%^{7,9}.

Lateral sinus thrombosis usually develops as a complication of chronic otitis media caused by the direct dissemination of the infection through the neighboring eroded bone⁴. It has been

reported in patient with an intact sigmoid plate indicating propagation by the thrombophlebitic spread through small emissary vein^{4, 6,10,11}. Lateral sinus thrombosis is ranked second to meningitis in the pre antibiotic era and lateral sinus thrombosis occurred largely as a complication of acute otitis media¹⁰

Clinical features vary according to the stage of the disease. Patient present with head ache, fever and otorrhoea^{10,11}. The classical case of lateral sinus thrombosis in pre antibiotic era typically produced a picket fence fever curve, due to periodic release of haemolytic streptococci from septic sinus thrombus¹. With the occlusion of the lumen of the sinus, interruption of cortical venous circulation results in head ache, papilloedema and increased intracranial pressure^{10,11}. Tenderness and oedema over mastoid (Grisinger's sign) are pathognomonic of lateral sinus thrombosis and reflex thrombosis to mastoid emissary vein. With the extension of thrombophlebitis into the jugular bulb and internal jugular vein, pain may be present in the neck, particularly on rotation

The antibiotic era has seen a change in not only the clinical presentation of lateral sinus thrombosis, but also bacteriology¹. Beta haemolytic streptococcus is no longer dominant organism^{1,6}. Since chronic, rather than acute infection more commonly precede lateral sinus thrombosis, cultures characteristically yields mixed flora including bacteroids, staphylococcus, enterobacteriaceae, proteus, pseudomonas and other species^{1,3,4}. Since antibiotics are commonly used during the prodromal ear infection, blood culture is often negative^{1,2}.

CT and MRI are the current imaging tools of choice in making diagnosis. CT scan usually demonstrate the "delta sign" an empty triangle at the level of sigmoid sinus, but this sign is not always detectable and not all thrombus can be demonstrated by CT. MRI is more sensitive than CT in detecting the thrombus. It shows blood flow, sinus obstruction and subsequent reversal of flow (figure 2). On gadolinium-enhanced MRI, thrombus appears as soft tissue signal associated with vascular bright appearance of the dural wall – the "delta" sign as seen with gadolinium enhanced MRI^{11,12}(figure 3) This is the investigation of choice,

Table I: Showing age and sex distribution

Age in years	No. of cases (n=12)	Percentage (%)	Male	Female
5-10	2	16.6%	2	-
11-20	3	25%	2	1
21-30	5	41.6%	4	1
30-40	2	16.6%	1	1
	12		9	3

Table II: Showing symptoms

Symptoms	Cases (n=12)	Percentage (%)
Ear pain	12	100%
Ear discharge	12	100%
Fever	11	91.6%
Headache	10	83.3%
Vomiting	6	50%
Swelling in the mastoid region	5	41.6%
Vertigo	3	25%
Swelling & pain in the neck	1	8.3%

Table III: Showing clinical signs

Signs	Cases (n=12)	Percentage (%)
Foul smelling ear discharge	12	100%
Attic/marginal perforation	12	100%
Cholesteatoma	12	100%
Granulations in the ear canal	5	41.6%
Sagging of the posterior canal wall	2	16.6%
Post aural fistula	2	16.6%

Table IV: Showing intra operative findings Findings

	Cases (n=12)	Percentage (%)
Lateral sinus thrombosis alone	4	33.3%
Lateral sinus thrombosis with peri sinus abscess	5	41.6%
Lateral sinus thrombosis with peri sinus abscess, postaural fistula	2	16.6%
Lateral sinus thrombosis, meningitis, cerebellar abscess.	1	8.33%

and should be performed in conjunction with CT, there by fully evaluating associated otologic and cerebral pathology¹².

Once the diagnosis is made, combination of broad-spectrum antibiotics and surgical treatment is necessary to keep the mortality rate at 25%⁷. Surgery includes mastoid exploration, exposure of sinus, incision and drainage and removal of as much clot as possible¹⁴. Free bleeding from both ends of the incised

Table V: Showing previous studies by other authors & present study

Year	Authors name	Study period (yrs)	Cases	Mortality (%)
1982	Teichgraber et al ¹	10	6	16%
1987	Samuel et al ¹³	6	45	0 %
1988	Amiramjdi ²	7	16	0 %
1990	O'Connell ⁶	-	3	0 %
1999	Sym's et al ³	5	6	0 %
2002	Bardley et al ¹⁴	6	9	0 %
2003	Ooi et al ⁹	4	4	0 %
2006	Present study	7	12	0 %

sinus is desirable. If there is no bleeding, evacuation of as much as clot as possible will suffice^{1,8}. Before the introduction of antibiotics it was felt desirable to obtain free bleeding from each ends of the incised sinus, but now it is thought be unnecessary to follow the clot centrally to obtain free bleeding nor it is thought be necessary to remove organized thrombus⁶.

Most authors agree that there is no place for anticoagulants in the management of lateral sinus thrombosis^{1,10}. Anticoagulants arrest the spread of thrombosis but may increase the risk of venous infarctions and therefore no longer recommended¹¹. Unless thrombus propagates after surgery, anticoagulants are not recommended^{3,5}.

In the pre antibiotic era, ligation of internal jugular vein was performed almost routinely in order to avoid dissemination of thrombophlebitic process and septic emboli⁴. Recent authors are of the opinion that with modern antibiotic therapy internal jugular vein ligation is not required⁶. Internal jugular vein ligation should be reserved for those cases in which septicemia and embolisation do not respond to initial surgery and antibiotic treatment^{7,8,10,11}. The presence of lateral sinus thrombosis mandates further investigation for additional intra cranial complication. In preantibiotic era lateral sinus thrombosis had associated complication in 80% patient. The development of antibiotics has reduced the incidence of complication to 20%³.

CONCLUSION:

Lateral sinus thrombosis is now a rare intracranial complication of otitis media. An awareness of this condition is necessary for early diagnosis and treatment. Lateral sinus thrombosis should be suspected in patients with persistent fever, otorrhoea and headache despite adequate antibiotic treatment. Prognosis is good if treatment with antibiotics and surgery is instituted early.

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