



The Libyan International Medical University
Faculty of Basic Medical Science



Correlation between dental infections and the development of cavernous sinus syndrome

Hadil Elawami

2112

Supervised by: Dr. Eman Layas

Assisted by: Dr. Awali Nashad

Report Submitted to fulfill the requirements for Scientific Research Activity

Date of Submission: 11/03/2020

: Abstract

Cavernous sinus and its direct communication to dental structures can predispose individuals to "Cavernous sinus Thrombosis", which can be developed due to the spread of:

Paranasal Sinus infections in the (of dental origin), Or due to the spread of infections from (Gingivitis)/(Parapharyngeal abscess) "in the Pharyngomaxillary space".

Or an abscess in the buccal spaces via "Buccal mucosal laceration", which may be caused by an ill-fitted denture and dental extractions.

Misdiagnosis and inappropriate treatment of Dental infections for example, The neglectance of Dental Hygiene, leads to the Development of CST.

: Introduction

"*Cavernous sinus Thrombosis*" It is a rare medical emergency and a life threatening condition in which blood clots are formed within the Cavernous sinus, through sepsis and disseminated Intravascular coagulation(1).

Because the Cavernous sinus contains vital neuronal structures, and the elevated risk of hemorrhage. Before the development of Antibiotics the mortality rate was almost 100%.(1)

CST can be aseptic which may result from surgery or trauma. The spread of infection from infected teeth can proceed mainly by "Venous Pathways". CST has different symptoms depending on the affected anatomical structures(4):

Lesions involving the entire sinus:

Ophthalmoplegia "the paralysis of the external extraocular muscles secondary to the dysfunction of CN III / CN IV", *Diplopia*, *Periorbital ecchymosis*. *Fixed dilated pupils* "due to damage of the parasympathetic fibers", Or even the Loss of vision (4).

Impaired vascular drainage for the face and eyes: *Meningitis*, *Subdural empyema* "collection of pus between the dura and arachnoid matter"(2).

Damage to the sympathetic plexus: Leads to *Horner's syndrome* "Miosis/ptosis/anhidrosis"(4)

Damage to CN V (V1/V2): Sensory loss in face/scalp/maxilla/nasal cavity/palate (4).

Damage to CN VI *Lateral gaze palsy* "The inability to move the eye in a single direction", which is an isolated early sign of CST (3).

:Methods and materials

The methods for this paper was collected from the article (3) which used the following methods: A case report of :

A 17 year old male with history of *Sinusitus* which developed to consciousness disturbance .

On examination: GCS 12/15 , Stiff neck , Tachycardia , Vomiting , high grade fever .

Lab tests: revealed : C.Reactive protein , CSF Protein, CSF Leukocytes (80% Lymphocytes), Glucose Concentration.

CT Scans : revealed Thrombosis in the right internal jugular vein.

Thrombosis in both cavernous sinuses, and a collection on the outer wall of the orbital cavity .

MRI: revealed Pansinusitus ,Orbital cellulitis, bilateral Cavernous sinus thrombosis "which extended to the lateral wall", meningeal contrast enhancement and bilateral Ischemic stroke .

Whereas article(4) used the following methods : A case report of :

A 60 year old male who is Diabetic (controlled) , presented to the dentist with a history of "Tooth pain" of one week .

On examination : Swollen right cheek

Pus in the (Upper right 3rd molar) , which was extracted.

After the 15th day of extraction : Chills , fever , Cheek pain

Patient was admitted where he was febrile with high pulse rate

After the admission : Incision and drainage are done (on the right buccal area) "120ml of pus was drained " .

1 weak after : the patient suffered from :

Decreased urine output ,upper GIT bleeding and diminished level of consciousness.

Clinical Diagnosis was found to be : Septic shock, Secondary acute renal shutdown and DIC .

The patient was admitted to the ICU .

Discussion:

It is a part of the Brain's *Dural Venous sinuses* . Two sinuses positioned on "*Sella tarcica*" connected by the *Intercavernous sinus*, which is the way for the infection to spread between the two sinuses . Right below the "*Sphenoid sinus*"(2).

Nerves affected are (5) :

Cranial nerves III/IV/V1/V2 "that pass through its lateral walls " .

CN-VI "That passes through the center" and Sympathetic plexus.

Cavernous sinus works as a "conduit" for venous blood, because different venous tributaries drain into it . Such as (5): *Superior Ophthalmic vein, Inferior Ophthalmic vein* "Anterior/Medial wall of orbit " , *Superficial middle cerebral vein* "Of temporal bone", *Efferent Hypophyseal veins* and also communicates to the "*Deep facial vein*".

It supplied by petrous part of *internal carotid artery*.

Dural sinuses , Emissary veins and cerebral veins contain no valves ; allowing blood to flow in either directions " Bidirectional "Therefore, bacteria or thrombi from another facial region can spread to the cavernous sinus(2).

Trabeculated sinus act like "sieves" , thus trapping bacteria/emboli and thrombi , that progresses from anterior infected sites . " face/nose/soft palate and teeth" Infected Foci from "Dental abscesses" Involved in the *Retromandibular vein* or it's connecting veins that reach the Cavernous sinus via the *Pterygoid plexus of veins* (Which is considered the Posterior route for the spread of infections)(4). The Anterior route consists mainly of the venous collaterals from the *Ophthalmic veins*.

The Clinical manifestations include (2):

Fever , Ptosis "dropping of the upper eyelid" / *Mydriasis* / Weakness of the eye muscles (Due to CNIII dysfunction) *Chemosis* "Swelling of the conjunctiva" (Due to occlusion of the ophthalmic veins), *Proptosis* "Abnormal protrusion or displacement of the eye".

Microbial findings, such as (1):

The most commonly identified organism (*Staphylococcus Aureus*) "60-70%".

Streptococcus (*Streptococcus Pneumoniae*) or any Gram -ive rods

Fungi such as (*Aspergillus*).

Diagnostic features may include (3) :

CSF may contain : Elevated levels of WBC's / Elevated levels of proteins

CT-scans/ MRI's are the diagnostic modalities of choice for CST (To differentiate between it and *Orbital cellulitis*)

That reveal the: "*enlargement and expansion of the Cavernous sinus*"

Or the *Dilation of the " superior ophthalmic vein "* .

The proper Treatment and management(1)/(2) :

Must include proper treatment of primary infection site such as :

→ *Sinusitis* → *Dental abscess* → *facial cellulitis*

The use of High doses of IV Antibiotics with the duration of (3-4 weeks) such as :

→ *Nafcillin* (*Vancomycin* in case of resistance) → *Metronidazole*

"That are preferably broad spectrum" .

Anticoagulant therapy (Heparin) (3):

which may be helpful in the prevention of the spread of thrombosis and it may inhibit further thrombogenesis ,but it is still debateable because of possible bleeding complications.

Corticosteroids maybe used as an anti-inflammatory therapy (3) .

:Conclusion

Cavernous sinus thrombosis is a rare disease but mortality rate remains high, even after the breakthrough of antibiotics.

Some "Unethical" practices and the lack of awareness of dental health , can lead to severe life-threatening complications of (Dental infections). Therefore , Dental health education should be spread

Early diagnosis of this condition and giving aggressive antibiotic treatment as soon as possible (4).

: References

1. J Korean asso.Oral maxilla fac. , Cavernous sinus thrombosis caused by a dental infection, 2014 August.
2. Kuybu O, Dossani RH , Cavernous sinus thrombosis , 2019 April.
3. Adnane Mohamed Berdai, Abdelkarim Shimi, Mohammed Khatof , Cavernous sinus Thrombophlebitis sinusitis complications, 2013.April.08
4. John R. Ebright(MD) , Mitchell T. Pace(MD), Asher F.Niazi (MD) , Septic Thrombosis of the cavernous sinus ,2001 April 9.
5. Ruben Ngnitewe , Fassill B.Mesfin , Neuroanatomy "Cavernous sinus" , 2019 April 8