A Case Report On Septic Cavernous Sinus Thrombosis In A 10 Year Old Rural Fulani Girl From North-Western Nigeria Associated With Bilateral Orbital Cellulitis

Mohammed-Nafi'u R[1], Alhassan AS[2], Okon EJ[3], Aliche V[4], Asemoh J[5], Nnadi, ET[6]

[1]-Department of Paediatrics, State Service Hospital, Abuja, Nigeria
[2]-Department of Public Health, State Service Hospital, Abuja, Nigeria
[3]-Departments of Paediatrics, National Hospital, Abuja, Nigeria
[4]-Departments of Optometry, State Service Hospital, Abuja, Nigeria
[5]-Departments of Medicine, State Service Hospital, Abuja, Nigeria
[6]- General out Patient Department, State Service Hospital, Abuja, Nigeria

DOI: 10.29322/IJSRP.10.03.2020.p9981
http://dx.doi.org/10.29322/IJSRP.10.03.2020.p9981

Abstract- Septic Cavernous Sinus Thrombosis (CST) is a rare infective condition affecting the cavernous sinus in the brain associated with high morbidity and mortality, especially when appropriate and prompt intervention is delayed. Although there is limited data on CST globally, the low prevalence in developing countries may not be unconnected with factors such as poor health seeking behaviour of the people, inadequate healthcare facilities and the dearth of radio-imaging diagnostic techniques, as well as low level suspicion for CST amongst physicians. Here is a case report on a 10 year old indigent nomadic (Fulani) girl diagnosed to have septic cavernous sinus thrombosis and bilateral orbital cellulitis confirmed by enhanced computed tomography (CT) scan of the brain. The case would have been missed, were it not for the intervention of a "Good Samaritan" who facilitated her access to the right medical facility for timely intervention.

The objective of this case report is to highlight on the importance of having high index of suspicion for CST and initiating therapy promptly, in resource constraint settings for better outcomes and reduced morbidity and mortality.

Index Terms- Cavernous sinus thrombosis (CST), orbital cellulitis, high index of suspicion

I. INTRODUCTION

Cavernous sinus thrombosis (CST) is the formation of septic or aseptic blood clots within the cavernous sinus. Septic CST usually results from sepsis or spread of infections from surrounding facial or other intracranial structures while aseptic CST can arise from trauma or pro-thrombotic aetiology.[1] Because of the complex neurovascular anatomy of the cavernous sinus and its intimate relationship with other intracranial structure, septic thrombosis involving the sinus is usually taken with very serious concern. Propagation of septic emboli from infected foci on the face and other intracranial structures through valveless veins constitute major source of infections.[2-3] Other risk factors for CST include trauma, immunosuppressive states, obesity, thrombophilia, chemotherapy and dehydration.[4]

It is a rare disease which can end with a fulminant outcome. However, the introduction of antibiotics has significantly reduced the morbidity and mortality. Despite that, early diagnosis and prompt treatment is key to favourable outcomes in the management.[3,5] Septic causes are mostly caused by bacterial organisms, but other micro-organism such as viruses, parasitic and fungal are also seldom implicated. Staphylococcus aureus is the commonest organism accounting for about 70% of septic causes; others include streptococcal species, pneumococcal, gram negative species, Bacteriodes and Fusobacterium. Other rarely implicated organisms such as the human immunodeficiency virus (HIV), cytomegalovirus, measles and aspergillus have been reported.[6]

There is dearth of data on the incidence of CST[7]. It account for up to 1-4% of cerebral and sinus thrombosis. Frank et al[8] estimated an annual incidence of 0.2- 1.6/1000,000 per year,[8] while Maliha etal[9] reported an incidence of 7/1000,000 in India, they attributed the increasing incidence to the emergence of newer and more advance diagnostic imaging technology in the evaluation of suspected cases. There is conflicting reports in sex prevalence, Weerasinghe et al[10] documented a male predominance with a ratio of 2:1.

The clinical presentation of CST depends on the structures affected. Most often the symptoms and signs are as a results of venous obstruction and damage to cranial nerves.[11] The classical symptoms include headache, fever, photophobia, chemosis, visual impairment, vomiting, convulsion or altered level of consciousness.[12-13] Complications such as cranial nerve palsy, visual impairment, thrombosis in the lateral and superior sagittal sinus, infarct or ischaemia around related structures could occur.[12]

Radio imaging, especially enhanced contrast Computed Tomography and Magnetic Resonance Imaging (MRI) are the most preferred diagnostic modalities. However, diagnosis could

be challenging and easily missed in resource constraint settings where there is dearth of modern diagnostic facilities, unless where physicians maintain high index of suspicion and follow it up, accordingly.[11,14] Other investigations are targeted at suspected causes.[3]

Prompt and early use of broad spectrum intravenous antibiotics is the main stay of treatment. This practice takes into consideration, the commonest causative agents or based on culture and sensitivity pattern. Anticoagulant has also been found to be useful, other modalities of treatment depend on identified causes.[15]

We report a case of an indigent 10 year old nomadic Fulani girl, from a rural setting in North-west, Nigeria, who was brought into our facility on the 21st September, 2019. She presented with three day history of high grade fever, generalized throbbing headache, generalized body rashes, bilateral purulent eye discharge, red eyes with swelling and inability to see. There was also history of joint and bone pain associated with inability to walk, no associated convulsion or irrational talk, neither was there history of any insect or snake bite. No history of boil on the face or nasal discharge. All the above symptoms were noticed about three hours after she came back from the bush where she went to fetch firewood. Parents gave about 10mls of herbal concoction diluted with water twice and applied an unknown eye drop obtained from a local patent medicine shop twice to both eyes before presentation.

Significant examination findings at presentation, were that of an acutely ill-looking child, in obvious painful distress, irritable, febrile 38.6^{0C} (axillary temperature), fully conscious, in obvious painful distress, generalized maculopapular rashes of varying sizes with few intersperse hyperpigmented patches, pale, bilateral purulent eye discharge, redness and swelling of the eyes, marked photophobia, proptosis, conjunctival chemosis, inability to open both eyes and tenderness over the eye balls. She had tenderness in all the limbs but no swelling, no cranial nerve palsy, no significant lymphadenopathy, no scratch or sting mark, acyanosed, anicteric, bilateral pitting pedal oedema up to the mid-thigh, no nuchal rigidity, kerning and brudzinski signs not elicited because of severe pain across the joints. Vital signs were; PR-92b/m, regular with good volume and BP-100/60mmhg, HS-SIS2 only, RR-24c/m. Other systems were essentially normal.

Initial diagnosis was that of sepsis (meningitis and bilateral orbital cellulitis) with cavernous sinus thrombosis, other differentials considered were Sickle Cell Disease (SCD), Leukaemia, Rheumatic fever and Lyme disease. She was commenced on high dose intravenous ceftriaxone, crystalline penicillin, dexamethasone, pentazocine, and dexamethasone eye ointment and gutt ciprofloxacin.

Forty eight hours after admission, fever and headache had resolved, other symptoms were still present. Patient was jointly reviewed by an Ophthalmologist and an Optometrist with examinations findings of copious purulent eye discharge, conjunctival and orbital chemosis, generalized bilateral blepharitis, peri-ocular and corneal oedema with associated proptosis, photophobia, significant loss of light perception and widely fixed and dilated pupils with extraocular muscle limitations. Slit lamp biomicroscope showed anteriorly displaced granulomatous uveal tissues in the right eye while the left eye shows iris bombe and anterior chamber cells. Raised intraocular pressure in the right eye (35mmHg) while that of the left eye (30mmHg).

Normal saline irrigation was commenced before all the eye medications are applied. Subconjunctival dexamethasone, gutt timolol, tab Diamox, Maxitrol ointment and later gutt diclofenac (replaced Maxitrol). Gutt Pilocarpine was also added to the treatment but was not available. Five days after admission, she was able to open her eyes unaided.

On day eight, enhanced Computed Tomography (CT) was done which revealed a left Cavernous sinus thrombosis with the following findings (There is a small filling defect in the left cavernous sinus which measures HU 40 in post-contrast studies, where the surrounding cavernous sinus measures HU 142 (7 days post-presentation). This finding was highly suggestive of cavernous sinus thrombus. The ophthalmic veins and the dural sinuses were normal in appearances. The internal jugular veins were also normal. The optic nerves and the optic chiasma were normal with uniform enhancements present. There were no intraconal lesions within the orbits. The globes were not flattened posteriorly. The cerebral hemispheres were normal in CT densities with no intracranial collection present in the intra-axial or extra-axial regions. There were no areas of meningeal enhancements, which exclude meningitis. There were no solid lesions present, and midline structures maintained their positions. The pituitary gland was found to be normal. The circle of Willis was normal. The lateral, 3rd and 4th ventricles were normal in size with no effacements and no features of raised intracranial pressure.). Fig1. Based on the above findings a definitive diagnosis of left cavernous sinus thrombosis complicating bilateral orbital cellulitis and sepsis was established.

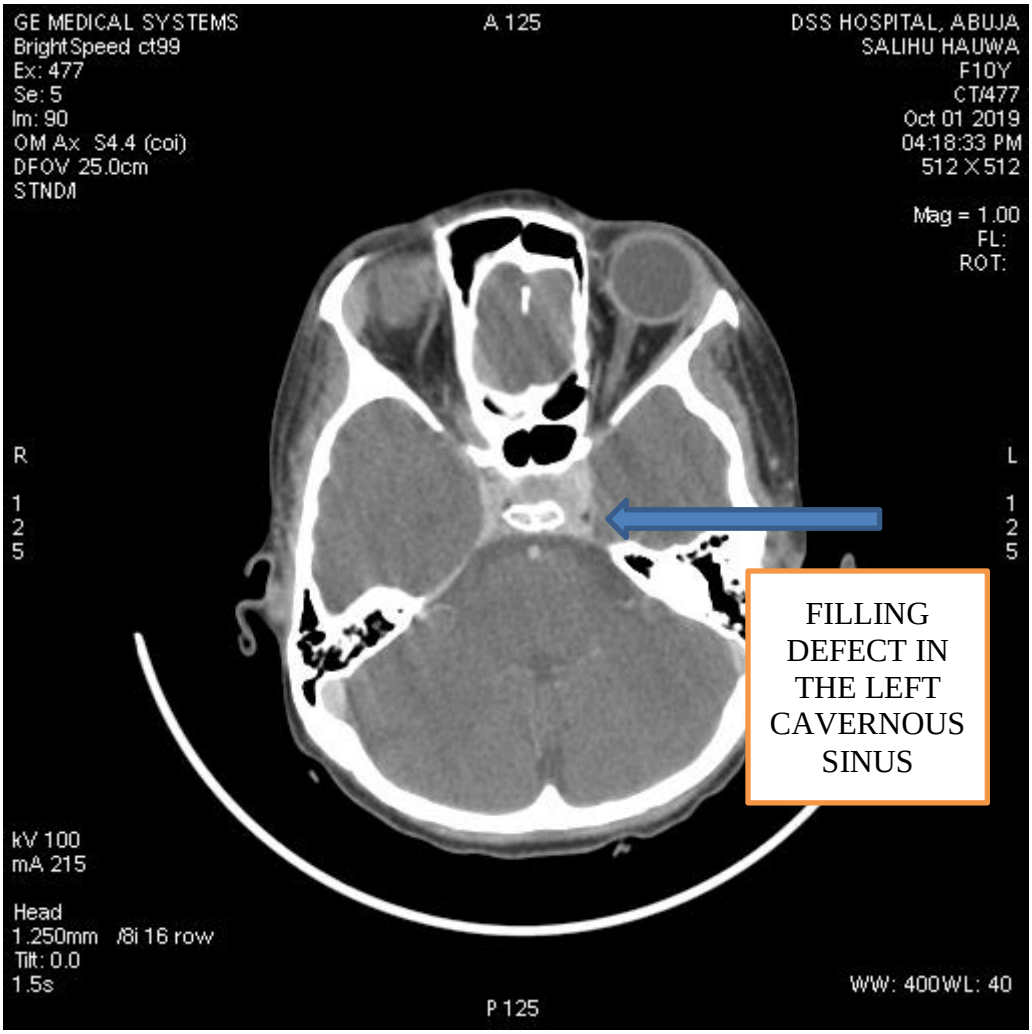


Fig I: Contrast enhanced Computer tomography showing filling defect in the left cavernous sinus as shown by the arrow in blue on day 8th of Admission

She was also reviewed by the Dermatologist who documented post inflammatory hypo and hyperpigmented rashes in keeping with meningococcaemia.

By the tenth day on admission, pain had resolved and rashes were healing. Although she developed limitations of movement on both elbow and left leg, urgent x-ray of affected limbs showed no abnormality.

Ophthalmic review showed a reduction in the intraocular pressure to 25mmhg. However, there was corneal haziness on the right eye with formation of occlusio pupillae. The left eye however, was found to have a mid-dilated pupil with photophobia and pupillary membrane, as well as lens opacity and posterior synaechia. Patient could only follow hand movement in both eyes. Gutt timolol was continued with gutt Xalatan, while gutt diclofenac was replaced with dextracin for the left eye and gutt Ivyflur for the right eye.

Having completed 21 days of intravenous antibiotics, patient showed significant clinical improvement. The rashes have healed appreciably, and she could move all limbs, and was able to open both eyes, although visual impairment persisted. There were no neurological deficits. She was eventually discharged and scheduled for a follow up. She was seen 15days later with sustained improvement except for the visual impairment. She was followed up for further evaluation and management by the Ophthalmologist. All the investigations done and the results are as shown on Table I & II below.

II. Discussion

Cavernous sinus thrombosis is a rare disease entity, especially in children. However, when it occurs, it is usually associated with high morbidity and mortality.[1,16-17] There is paucity of published data especially in an era of abundant antibiotic therapeutic options. Sweis and co-author[1] were only able to report 12 cases in thirteen years (2000-2013) at Philadelphia children hospital in United States (USA) while a retrospective study by Press et al[12] reported 10 cases in a retrospective study over a period of ten years among children aged 3-17 years, in university of Colorado, also from USA. In Nigeria, a study done over a ten year period, Adeoti et al[18] in Osogbo, South-Western region only reported 2 cases with CST among subjects aged 2-85 years. It is difficult to attribute the apparent low incidence of the reporting of CST in developing

countries, this might be as a result of missed diagnosis or death of those affected at home because of poor health seeking behaviour, distance of health facility, mystification of disease condition or poverty unlike in developing countries which might be related to early and prompt use of appropriate antibiotics. Our patient, a 10 year old nomadic Fulani girl from a rural setting in North-West, Nigeria had already resorted to alternative treatment with herbal concoctions until help came her way through unexpected means.

Our patient presented with bilateral purulent eye discharge, redness of the eyes, swelling and inability to open the eyes. She also had fever and typical skin rashes suggestive of meningococcaemia, along with laboratory evidence of sepsis such as leukocytosis with absolute neutrophilia and elevated erythrocyte sedimentation rate. Suspicion was more to bilateral orbital cellulitis and general sepsis as risk factors that predisposed the young girl to CST.

Cavernous sinus thrombosis has a variable clinical presentation,[3,14,18] the clinical features usually reflect the various causes or risk factors.[1] Headache, fever, redness of the eyes, swelling and inability to open the eyes were the commonest presenting symptoms in our patient. While the major clinical signs included redness, swelling and inability to see, photophobia, conjunctival chemosis and proptosis indicating that the eyes were the main source of the infection. Headache is related to the involvement of the ophthalmic and maxillary branches of the fifth cranial nerves.[12] while the ophthalmic signs and visual disturbances were related to the involvement of oculomotor, abducent nerves and posterior spread of the infections due to their relationship to the cavernous sinus.[12,2] Where affectation of the eyes is the main cause of CST, orbital manifestation become the most predominant clinical presentation. This has been documented in many literatures.[3,12-13,1]

No organism was isolated from both tissue and blood cultures. The inability to culture any organism may not be unconnected with the fact that there was delay in carrying out relevant investigations including blood and cerebrospinal fluid (CSF) culture due to financial constraints. This would have affected the culture results. This findings is consistent with reports in other literatures including that of weerasinghe et al.[10-11,19-20] Similarly lumbar puncture was not done in this patient at presentation and few days after because of the unstable clinical conditions and suspected raised intracranial pressure. Serological tests for HIV, Hepatitis B and C were all negative, although other viral causes cannot be completely ruled out since facility for viral culture was not available. The haemoglobin phenotype was HbAC.

Central nervous system manifestation such as irritability, confusion, convulsion, mental status changes and coma are not uncommon in septic CST.[19] Our patient presented with irritability and confusion but she was conscious.

Various radio imaging techniques are available for the diagnosis of CST, however, enhanced CT and MRI are the diagnostic investigations of choice.[8] Definitive diagnosis of CST in our patient was made using enhanced CT with a finding consistent of left CST.

Early diagnosis and use of broad spectrum antibiotics, anticoagulant and surgical drainage are the modality of treatment.[16,21] Prompt use of antibiotics have been found to be associated with good outcome and has significantly reduced both morbidity and mortality in CST.[1,16-17] Consistent with other reports in the literatures,[1,16-17,20] our patient responded very well to intravenous antibiotics. Patient received ceftriaxone and crystalline penicillin for 21 days. She also had intravenous dexamethasone, clexane and oral warfarin upon resolution of clinical and laboratory finding, although visual disturbances persisted.

Neurological deficits especially cranial nerve palsy and visual impairment are usually the commonly reported complications in CST.[13] Our patient suffered visual impairment with ophthalmic findings of panuveatis, lenticular opacities, ocular synchiae and reduced corneal reflex, dilated and fixed pupil. This was the only complication which is consistent with findings reported in other studies. [8,12,22-23] It is pertinent to note that the extent of retinal involvement was not ascertained due to media opacity resulting from complications of panuveitis and lenticular opacities. Patient would have benefitted from B-scan but, she was unable to access it due to financial constraint.

The management of this case was not without challenges. The patient was indigent and could barely afford the cost of treatment except for the philanthropic gesture of the managing team and the hospital Management. This resulted in delay in carrying out most of the laboratory and imaging tests. The parents initially resorted to the use of herbal concoction.

III. Conclusion

We present this case to highlight that with high index of suspicion and prompt use of antibiotics, morbidity and mortality in highly fatal disease condition like CST can be drastically reduced even in resource constraint countries such as Nigeria.

Ethical Consent was obtained from parents and assent from the child to enable us publish this case and provide information for research.

Table I. Investigations results

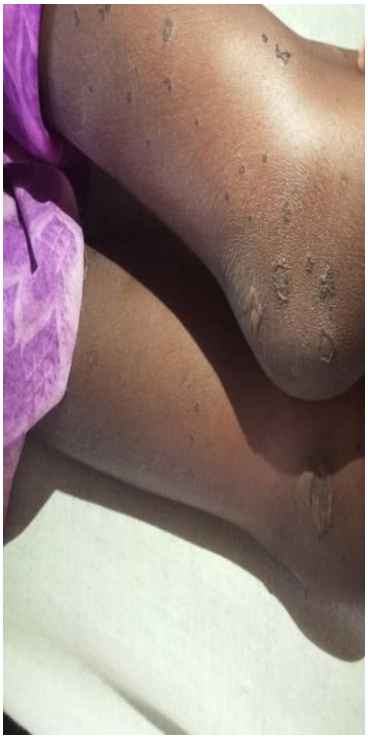
Investigations	Date	Date	Date	Date	Date	Date	Date	Normal Range	Comment
Full Blood Count (FBC)	21/9/19	23/9/19	30/9/19	3/10/19	4/10/19	9/10/19	10/10/19		
White Cell Count	30.6 x 10^9		15.6 x10^9	14.8 x10^9		7.5x10^9			Leucocytosis

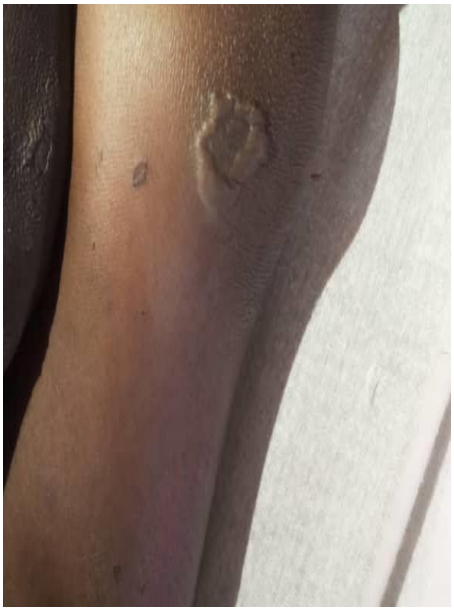
(WBC)								with NeNeutrophilia
Packed Cell Volume (PCV)	27%		32%	30%	29%			
Haemoglobin(Hb)	10.2g/dl,		11.3g/dL	10.8g/dL	10.4g/dL			
Platelets(PLT)	158		736	545	430			
Neutrophils	92%		78%	56%	56%			
Lymphocytes	4%		16%	26%	27%			
Erythrocytes Sedimentation Rate (ESR)	116mm/hr					75mm/hr	(male= 0-7mmhr) (female= 0 – 20mmhr)	Elevated
Malaria Parasite(MP)	Negative							
Electrolytes								
Sodium (Na)	131.3			131	139.3			Hyponatreamia
Potassium(K)	3.2			3.4	3.6			Hypokalaemia
Chlorine (CL)	94.8			102.8	109			Low
Creatinine (Cr)	19.4			16.8	18.4			
Urea (Ur)	5.6			2.3	2.3			
Blood film	Essentials normal							
Blood Group	O Rhesus negative							
Urinalysis								
Protein		negative						
Blood		negative						
Bilirubin		negative						
Specific gravity (SG)		1.010						
PH		8.0						
Total Protein		6.3g/dl					(6.6 – 8.8mg/dl)	
Albumin		4.1g/dl					(3.5 – 5.2) g/dl	
Widal		Non-Significant Titres						
Skin Snip			No microfilaria					
Uric Acid				1.5 mg/dl			(2.6 – 6mg/dl)	

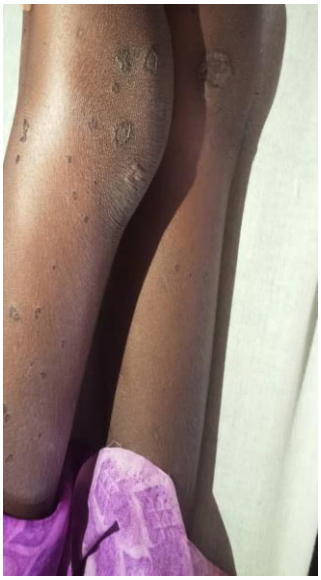
Wound swab Microscopy anand sensitivity	No growth	
Blood Culture		negative

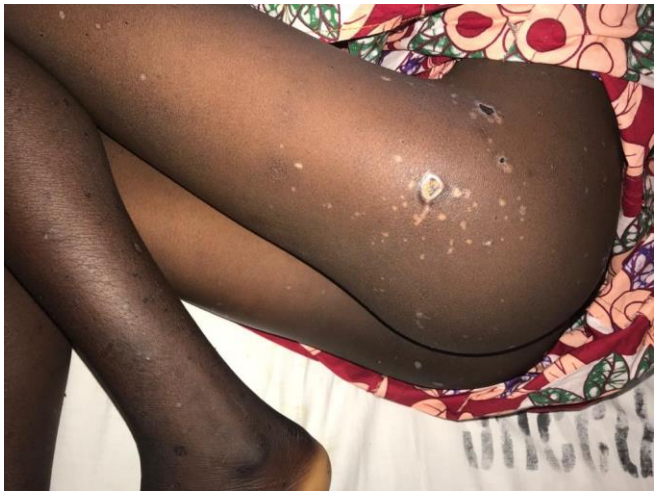
Table II. Further Investigation Results

	30/9/19	4/10/19	10/10/19	Normal Range	Comment
Clotting Profile					
Prothrombin Time (PT)			18.4sec	(6.5-13.1)sec	
Partial Activated Prothrombin Time (PTTK)			32.1sec	(26-41)sec	
International Normalised Ratio (INR)			1.98	(0.6-1.2)	
Serological Tests					
HIV		Negative			
HBsAg		Negative			
HCAB		Negative			
Hb Phenotypes(HPLC)					
HbF	0.4%				
HbC	35%				
HbA	60.2%				
HbA_2	4.4%				
Rheumatoid Factors(Quantitative	17.9IU/ml		(0 - 14IU/ml)		
Anti DNA B	76.8 U/L		(0-170U/L)		
Lyme Disease (Borrela B)	Negative				
Antistreptolysis Titre (ASO)	150.6IU/ml		(0 - 200IU/ML)		
Antinuclear Antibodies (ANA)	Negative				









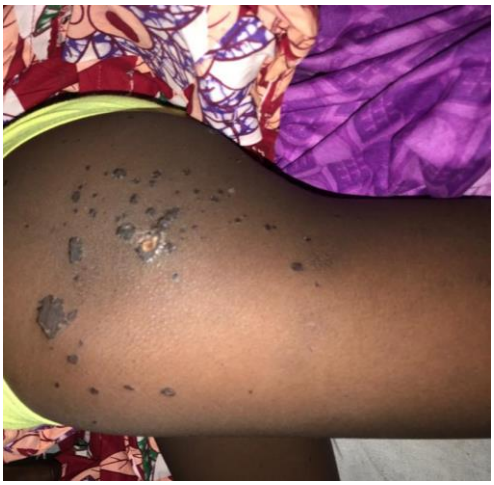


Fig 3: Photograph of patients on day 5 of admission

Fig 4- photograph of patient on day 8 of admission showing healing process

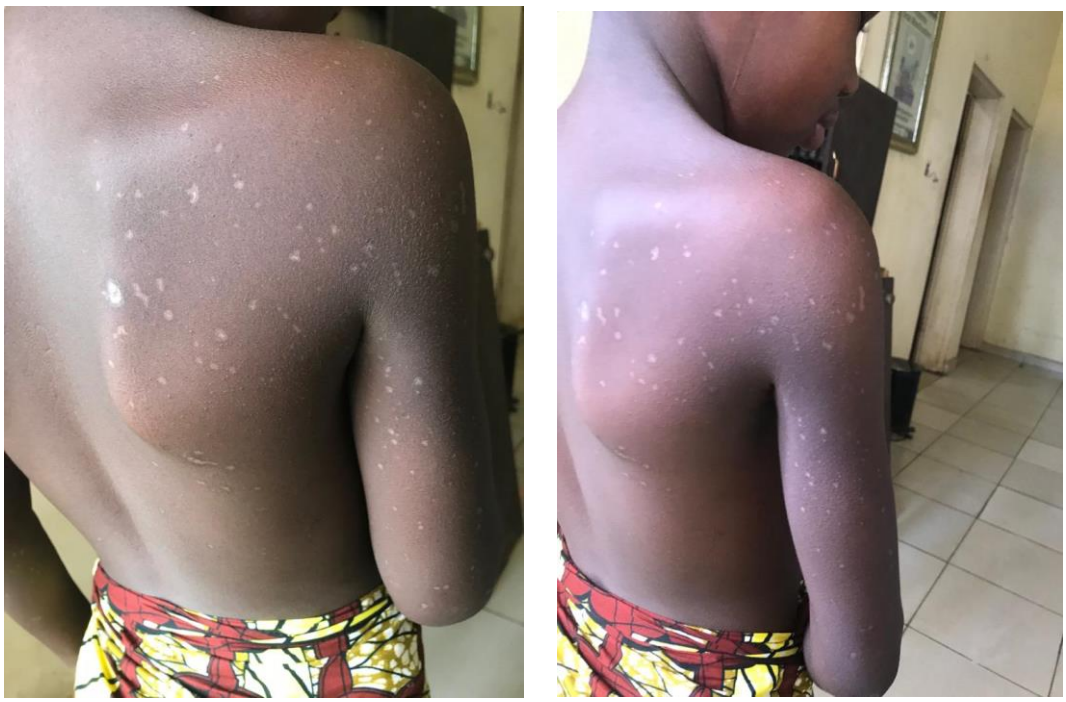


Fig 5: Photograph of patient at follow up, 15 days after discharged

REFERENCES

[1] 1. Sweis Rochelle, Jose Biller. Pediatric Neurology Briefs. Pediatr Neurol Briefs 2016; 30: 1–4.

[2] 2. Lee H, Kim H, Park J, et al. Septic cavernous sinus thrombosis with infectious arteritis of the internal carotid artery. 2015.

[3] 3. Mallick A, Pathak S, Shankar S, et al. Early Cavernous Sinus Thrombosis following unilateral pansinusitis in a child. BMJ Case Rep; 2015: 1: 1–4.

[4] 4. Torretta S, Guastella C, Marchisio P, et al. Sinonasal -Related Orbital Infections in Children: A clinical and Therapeutic Overview. J Clin Med 2019; 8: PMC6351922.

[5] 5. Jessica Sop D, Tager A. Pediatric Cavernous Sinus Thrombosis. Ann Clin Case Rep 2019; 4: 1706.

[6] 6. Dinkin M, Patsalides A, Ertel M. Diagnosis and Management of Cerebral Venous Diseases inNeuro-Opthalmology; Ongoing controversies. Asia Pac J Opthalmol(Phila) 2019; 8: 73–85.

[7] 7. Ranjith KM, Lokesh S, Jaya SK, et al. A Combination of Moyamoya Pattern and Cerebral Venous Sinus Thrombosis: A Case of Tubercular Vasculopathy. J Trop Pediatr 2015; 61: 393–396.

[8] 8. Frank G, Smith G, Davies B, et al. Opthalmic manifestations and outcomes after cavernous sinus thrombosis in children. In: 45th Annual Fall American Society Of Opthalmic Plastic and Reconstructive Surgery(ASOPRS), Scientific Symposium, Chicago, October. 2014, pp. 16–17.

[9] 9. Maliha S, Akheel M, Singh S. Cavernous Sinus Thrombosis-Asuccinct outlook. J Head Neck 2014; 2: 67–72.

[10] 10. Weerasinghe D, Lueck CJ. Septic Cavernous Sinus Thrombosis: Case Report and Review of the Literature. Neuroophthalmology 2016; 40: 263–276.

[11] 11. Smith D, Vossoung A, Vorona G, et al. Pediatric cavernous sinus thrombosis. Neurology 2015; 85: 763–769.

[12] 12. Press CA, Lindsay A, Stence NV, et al. Cavernous sinus thrombosis in children: imaging characteristics and clinical outcomes. Stroke 2015; 46: 2657–60.

[13] 13. Ebright JR, Pace MT, Niazi AF. Septic thrombosis of the cavernous sinuses. Arch of Intern Med 2001; 161: 2671–2676.

[14] 14. Okunola PO, Ofovwe GE, Abiodun MT, et al. Superior Sagittal Sinus Thrombosis Complicating Typhoid Fever in a Teenager. 2012.

[15] 15. Mathew T, Hussein A. Atypical Cavernous Sinus Thrombosis: A diagnosis Challenge and Dilemma. Cureus 2018; 10: e3685.

[16] 16. Dlamini N, Billinghurst L, Kirkham F. Cerebral Venous Sinus (Sinovenous) Thrombosis in Children. Neurosurg Clin N Am 2010; 21: 511–527.

[17] 17. Mokgacha K, Maruza M, Sesay S, et al. Cavernous Sinus thrombosis. Turk J Pediatr 2017; 59: 719–723.

[18] 18. Adeoti C, Adejumo O, Isawumi M, et al. Orbital Cellulitis in a Tertiary Institution in Nigeria: Improving Outcomes. Niger J Ophthalmol 2017; 25: 141–5.

[19] 19. Taylor P. Cavernous sinus thrombophlebitis. Br J Opthalmol 1957; 41228–237.

[20] 20. Kojan S, Al-Jumah M. Infection related cerebral venous thrombosis. J Pak Med Assoc 2006; 56: 494–497.

[21] 21. DiNubile MJ. Septic thrombosis of the cavernous sinuses. Arch Neurol 1988; 45: 567–72.

[22] 22. Visudtibhan A, Visudhiphan P, Chiemchanya S. Cavernous sinus thrombophlebitis in children. Pediatr Neurol 2001; 24: 123–12.

[23] 23. Varshney S, Malhotra M, Gupta P, et al. Cavernous sinus thrombosis of nasal origin in children. Indian J Otolaryngol Head Neck Surg 2015; 67: 100–105.

AUTHORS

First Author – Mohammed-Nafi'u R, Department of Paediatrics, State Service Hospital, Abuja, Nigeria, email- rabbashiya2008@yahoo.com,
Phone Number- +2348034069268
Second Author – Alhassan AS, Department of Public Health, State Service Hospital, Abuja, Nigeria
Third Author – Okon EJ, Departments of Paediatrics, National Hospital, Abuja, Nigeria
Fourth Author – Aliche V, Departments of Optometry, State Service Hospital, Abuja, Nigeria
Fifth Author – Asemoh J, Departments of Medicine, State Service Hospital, Abuja, Nigeria
Sixth Author – Nnadi, ET, General out Patient Department, State Service Hospital, Abuja, Nigeria