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Non-Visible Penetrating Brain Trauma: A Case Report

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1. Abstract

Traumatic Brain Injury (TBI) Is One Of The Leading Causes Of Acquired Disability And Death In Infants And Children. Falls And Motor Vehicle Collisions, Abuse And Assaults In Adolescents Are Unfortunate Inflicted Causes Of TBI. Penetrating Brain Injury Is A Severe Form Of Traumatic Brain Injury. It Is Significantly Less Prevalent Than Blunt Head Injury But Carries A Much Worse Prognosis, Expecially In Pediatric Population. When A Type Of Injury Like This Does Occur, The Invading Intracranial Foreign Body Usually Remains Lodged Within Its Entry Position: Surgical Approaches For Removals And Intensive Management During These Procedures Are Particularly Complex. The Most Common Neurological Abnormalities Were Hemiparesis Followed By Cranial Nerve Deficits. Facial Nerve Deficits Were The Most Commonly Seen Cranial Nerve Abnormality. Immediate Seizures Were A Significant Feature In Patients With Stab Injuries To The Head Compared To Those With Gunshot Injuries.

We Report A Pediatric Case Of Penetrating Craniofacial Trauma And The Successful Multidisciplinary Management.

2. Abbreviations: TBI: Traumatic Brain Injury; CT: Computer Tomography

3. The Main Body of the Manuscript

We Report A Case of A 7-Year-Old Girl Who Presented In The Casualty Of Civili Hospital In Brescia For A Penetrating Craniofacial Trauma. His Father Referred An Accidental Fall While Walking With A Pencil Hold In Her Hands. The Crying Child Was Conducted In A Spoke Hospital Nearby Their Home And The First Clinical Evaluation Revealed Only A Small Wound (< 1 Cm) At The Left Inferior Palpebral, And An Anisocoria With Associated Visus Deficit. The Anisocoria And The Visual Deficit Of Her Left Eye, Was Suggestive For A Direct Eye Trauma. The Computer Tomography (CT) Scan Section Showed The Presence Of An Entire Pencil That Crossed From The Left Orbital Fossa Into The Brain (**Figure 1 A, B**). None Sistemic Neurological Deficit Was Observed, And She Was Continuously Monitored (Heart Rate, Non Invasive Blood Pressure, Oxygen Saturation). The Patient Was Promptly Transferred To The Closed Hub Hospital (Spedalicivili Di Brescia). A Multidisciplinary Team (Anaesthetists, Neurosurgeons, Maxillofacial Surgeons, Ophthalmologists And Radiologists) Performed The First Clinical Evaluation, They Planned The Radiological Examination And The Subsequent Treatment And Potential Complications. The CT Scan Showed The Presence Of A Foreign Body Nearest To The Left Internal Carotid Artery; Therefore An ***Angiography*** Examination Was Needed.

After A Neurological Evaluation, The Patient Was Intubated In Order To Facilitate Other Diagnosis Paths And Treatment. She Was Invasively Monitored Using A Venous, Arterial, Vesical Catheter And A Temperature Monitoring Probe.

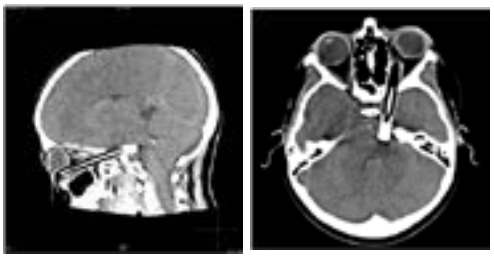

Figure 1 a, b: Computer Tomography (CT) scan section showing the presence of an entire pencil that crossed from the left orbital fossa into the brain.

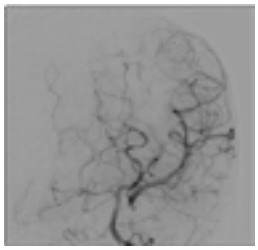

Figure 2: A selective angiography showing an occlusion of the Intracranial tract of left Internal Carotid Artery at the lacerous part, because of pencil compression.

A Selective Angiography Was Made (Both Internal Carotid Arteries And Left Vertebral Artery Was Studied) And It Shown An Occlusion Of The Intracranial Tract Of Left Internal Carotid Artery At The Lacerous Part, Because Of Pencil Compression. The Compensation Of Left Cerebral Perfusion Through Anterior And Left Posterior Communicating Arteries Was Confirmed And The Left Internal Carotid Artery Has Been Embolized (Fig. 2). At The End Of The Procedure, A Final Angiography Confirmed A Complete Occlusion Of Left Internal Carotid Artery With Normal Vascularization Of Left Brain Parenchyma. During The Procedure (About 1 Hour), The Patient Was Sedated With Propofol And She Was Hemodinamically Stable.

The Patient Was Moved On Neurosurgical Operating Room For A Combined Second Step Surgery (Neurosurgey And Maxillofacial Surgery). The Target Was To Isolate Vascular And Cerebral Structures Before The Removal Of Penetrated Object.

A Left Pterional Craniotomy Access Was Made By Neurosurgeons Obtaining A Dissection Of TheSilvanus's Fissure, The Exposure Of The Left Internal Carotid Artery, Left Posterior Communicating Artery And All The Nearest Vascular Structures. At The Interpeduncolatecisterna Subarachnoid Haemorrhage Was Observed. Subsequently, The Maxillofacial Surgeons Safely Remove The Foreign Body From The Cutaneous Wound At The Left Inferior Palpebral, With A Little Bleeding But No Transfusion Nor Catecholamines Was Needed. She Was Emodinamically Stable During The Surgery And Normothermic; At The End Of Surgery Spontaneous Diuresis Was Present.

The Patient Was Transferred To The Pediatric Intensive Care Unit, Where She Was Extubated 12 Hours Later. When Awake, Only Left Eye Visus Deficit Was Recorded. The IcuStay Was Uneventful And She Was Discharged To Pediatric Maxillofacial Ward 2 Days After.

A Quick Physical Rehabilitation Was Started During Recovery And A Broad Antibiotic Therapy Was Started To Avoid Cerebral Infection. Post-Operative Ophthalmologist And Neurosurgical Evaluations Were Continuously Performed. Patient And Parents Were Supported By A Psychologist To Understand And Accept The Visual Deficit. A Good Clinical Course Was Reported During The Recovery. At The Fourteenth Day Patient Was Discharged To Home.

4. Discussion

The Age Of The Patient, The Complexity And Rarity Of The Traumatism, The Need To Intervene Promptly In An Emergency Regime, Were Important Factors In Determining The Clinical Therapeutic Management.HeadTrauma Is Exceedingly Common In Children, But Rarely Presents As A Penetrating Injury Of The Skull[1].Most Of These Injuries Are Due To A Fall. Penetrating Head Injuries Caused By Foreign Bodies Other Than Bullet And Shrapnel Are Extremely Unusual[2-4].Low-Velocity Head Injuries Differ From Gunshot And Missile Injuries In That They Do Not Cause Concentric Zones Of Cavitations And Necrosis. Instead, The Damage Is Predominantly Restricted To Hemorrhagic Infarction In The Line Of The Wound Track [5]. Operative Angiography Was Made For Avoid Massive Hemorrhage From Internal Carotid After The Pencil Removal And To Avoid Cerebral Embolisms: The Artery Was Obstructed And Injured By The Foreign Body. The Risks Of Ischemia Of The Left Cerebrum Was Real But The Collateral Flux Demonstrated During The Angiography Had Guaranteed A Good Residual Cerebral Perfusion. Neurosurgical Procedure Was Difficult And The Risk Of Blooding And Lesion Of Important Cerebral Structures Was Real.

In The Absence Of Injury To Vital Centers And Damage To Large Vessels, The Prognosis Is Generally Favorable. In This Case, The Early Treatment Reduced The Risk Of Delayed Vascular, Infectious And Epileptic Complications. In ICU The Patient Was Rapidly Extubated For A Direct Neurological Monitoring And Discharged To Home Without Major Complications(Except For The Left Visual Damage).

To Conclude, Penetrating Head Injuries In Children Constitute Only A Small Part Of The Total Number Of Traumatic Head Injuries Seen In The Emergency Room. It Is A Serious Injury That May Lead To Irreversible Brain Damage And Death. A Focal Neurological Deficit May Be Absent If The Non-Eloquent Area Of The Brain Is Involved. There Is No Doubt That The 'First Golden Hour' Following Trauma Is Important In Both

Adults And Pediatric Patients. Our Patient Survived The Fall And The Penetrating Injury Because She Was Operated Upon Promptly.

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