CASE REPORT
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Cerebrospinal Fluid Leakage Caused by a Hijab Pin in Sphenoid Sinus: a Magnetic Resonance Imaging Accident

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ABSTRACT

Foreign bodies in the sphenoid sinus are rare but also life-threatening conditions due to the location. Different adverse events, such as superficial cuts, extremity fractures, and even deaths, caused by accidentally inserting metal objects into the magnetic field have been reported previously. The authors present a unique case of a pin that penetrates the sphenoid sinus and causes cerebrospinal fluid (CSF) leakage during magnetic resonance imaging by the effect of the magnetic field. An embedded hijab pin on the left sphenoid sinus roof was identified and was carefully removed. Through the entrance of the pin, CSF leakage was observed and repaired. The presented case is valuable because it draws attention to the importance of the staff's carefulness during medical procedures and contributes to the literature.

Keywords: Accident, cerebrospinal fluid rhinorrhea, hijab pin, magnetic resonance imaging, sphenoid sinus

Introduction

Paranasal sinus foreign bodies are rare conditions that occur with maxillofacial trauma, penetrating injuries, motor vehicle accidents, and iatrogenic injuries. On the other hand, the sphenoid sinus is deeply located and less affected by penetrating trauma than other sinuses.[1] The foreign bodies reach the sphenoid sinus through the orbit or the nostril. Close relationship to vascular and neuronal structures leads to potentially life-threatening consequences in sphenoid sinus penetrating trauma.[1] Magnetic resonance imaging (MRI) includes the static and pulsed gradient magnetic and radiofrequency fields. The strong static magnetic field attracts metallic objects. Harmless objects may become projectiles resulting in even death.[2,3] Muslim women commonly use the hijab pin to secure the hijab.[4] A unique cerebrospinal fluid rhinorrhea case caused by a hijab pin due to the magnetic field during MRI was presented.

Case Presentation

A 44-year-old Muslim woman was presented with left-sided rhinorrhea and facial pain. According to her medical history, she had experienced a sudden severe pain in her nose and face during a routine brain MRI 4 weeks previously, and imaging had been discontinued. Complaints of the patient have continued ever since. On nasal endoscopy, left-sided clear rhinorrhea was observed. β2-transferrin protein detection test was performed on the collected rhinorrhea sample, and it was positive. Paranasal sinus computed tomography demonstrated a metallic foreign body in the sphenoid sinus crossing the sinus anterior posteriorly (shown in Figures 1 and 2). The foreign body was not associated with the optic nerve, carotid canal, or intracranial space. The patient underwent endonasal endoscopic surgery to extract the foreign body and repair the skull base defect. A pedicled left nasoseptal flap was prepared. After performing standard sphenoethmoidectomy, a hijab pin embedded in the sinus roof was identified in the left sphenoid sinus (shown in Figure 3) and was carefully removed (shown in Figure 3). The leakage of cerebrospinal fluid (CSF) through the entrance of the pin was observed. Tensor fascia lata, nasoseptal flap, and fibrin sealant (Tisseel, Baxter, Illinois, USA) were laid overlay, respectively, to repair the leakage of CSF. The patient was asked postoperatively whether she was wearing a hijab pin during MRI. She remembered that the MRI staff asked

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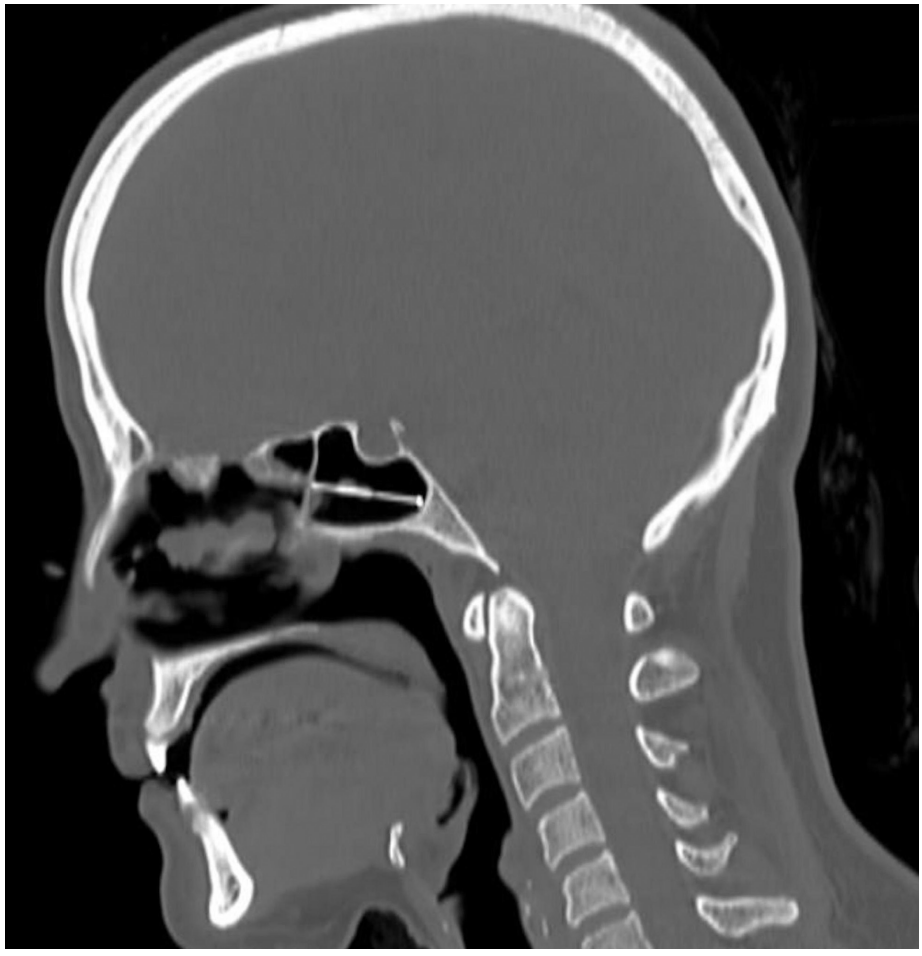

Figure 1. Sagittal computed tomography scan of the sphenoid sinus showing a foreign body in the sphenoid sinus crossing the sinus anterior posteriorly.

her to remove the pin, but she had absently pinned 1 of them to her shirt. The hijab pin was thrown out by the effect of the strong magnetic field and penetrated the sphenoid sinus and caused severe pain in her nose and face during the scan and then the development of left-sided rhinorrhea. The patient was discharged on postoperative day 7, and 4 months of follow-up were uneventful.

Main Points

- The presence of foreign bodies in the sphenoid sinuses is a rare condition.
- The strong static magnetic field can pull the ferromagnetic objects that may become projectiles.
- Magnetic resonance imaging-related serious injury caused by a needle has not been reported in the literature.
- This paper reports on a 44-year-old woman who presented with cerebrospinal fluid leakage because of a pin that penetrates the sphenoid sinus like a bullet with the effect of the magnetic field.
- The presented case is valuable in that it draws attention to the importance of notice and continuous training of the personnel during medical procedures in addition to contributing to the literature.

Discussion

A unique case of a hijab pin that penetrates the sphenoid sinus like a bullet due to the strong magnetic field of MRI was presented and caused CSF leakage. The sphenoid sinus is more protected against penetrating injuries due to its deep location. Foreign bodies can reach the sphenoid sinus via the medial canthus, orbital and transnasal routes. In the literature, it has been reported that sharp, hard, and long objects such as bullets, wooden/bamboo sticks, ballpoint pens, and pencils reach the sphenoid sinus.[1] According to the current literature, there has been no previous report of a pin in the sphenoid sinus. Small and sharp foreign objects such as pins and sewing needles can be ingested and aspirated by children and cause severe airway or digestive tract problems. Ingestion or aspiration of the pin has been reported previously in Muslim women since they hold the hijab pin between their lips before pinning the hijab.[4] In this case, the hijab pin inserted into the strong static magnetic field because of the patient's carelessness and inadequate staff control caused an unprecedented event. Magnetic resonance imaging has been considered a safe imaging method by patients and non-MRI staff because it does not contain ionizing radiation.[5] However, the strong static magnetic field can pull the ferromagnetic objects that may become projectiles to the MRI device.[2,5] Cross et al classified

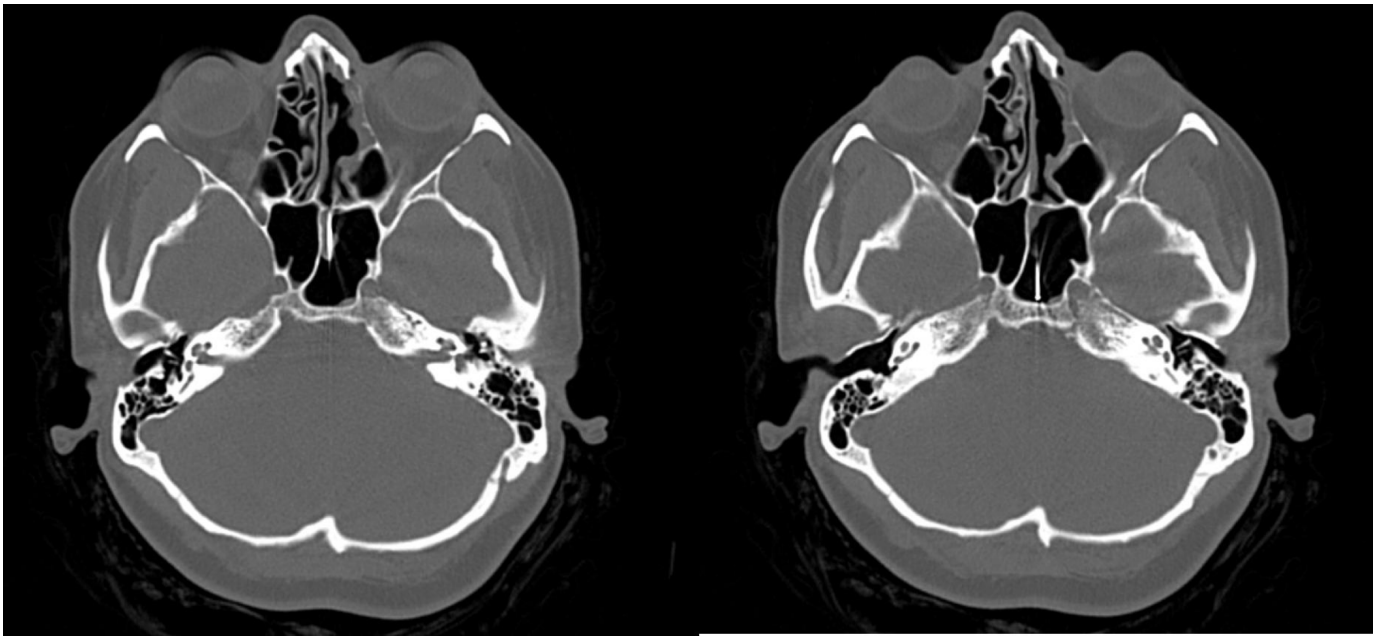

Figure 2. Axial computed tomography scan showing a foreign body in the sphenoid sinus crossing the sinus anterior posteriorly.

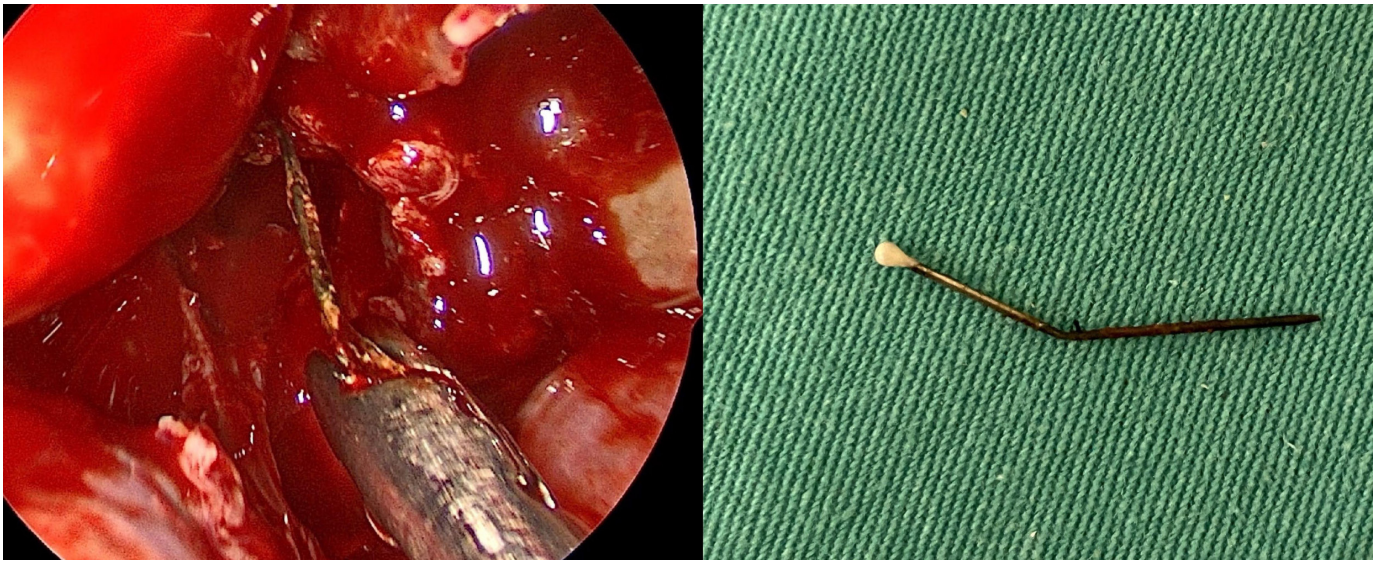

Figure 3. An embedded hijab pin removed from the sphenoid sinus.

metal objects that cause injury in the MRI area as environmental equipment (chairs, oxygen cylinders, cleaning equipment, anesthesia devices), implanted (vascular clips, pacemakers, cochlear implant magnets), adornments (jewelry, pins, zippers), and unintentional metallic objects (shrapnel from bullets, manufacturing debris).[3] Different accidents, such as superficial cuts, extremity fractures, and even deaths, caused by accidentally inserting metal objects into the magnetic field have been reported in the literature.[2] A few safety precautions were defined to prevent MRI-related adverse events. Patients should be informed and controlled for the removal of metallic objects before entering the MRI room. The MRI units should be segmented to prevent uncontrolled entry into the magnetic field.[3] Even if patients are warned about metallic objects and jewelry, both patients and staff can overlook pins and hairpins. However, severe MRI-related injury caused by a pin has not been reported in the literature. The presented case is valuable because it draws attention to the importance of awareness and continuous personnel training during medical procedures and contributes to the literature.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

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