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CASE-BASED UPDATE

A late onset adult seizure due to intracerebral needle: case-based update

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Abstract

Background and aim Late-onset seizure due to intracerebral needle is a rare entity. Most of them were clinically asymptomatic and rarely presented with seizure. Sewing needles are used in homicidal attempt in infancy or early childhood before the closure of the fontanels. Because of sociologic, politic, and scientific deficiencies subject remained untouched. We tried shedding some light on this ambiguous phenomenon.

Material and methods We report a 54-year-old man who was admitted to our neurosurgery outpatient department with epilepsy due to a sewing needle located in the left frontal lobe of the brain and made extensive literature review.

Result Patient's physical and neurological examinations were completely normal. All biochemical and hematological tests were normal. Cranial tomography demonstrated a linear density at the left frontal lobe compatible with a sewing needle. Patient was followed-up with antiepileptic treatment with no seizure. Sixty cases from up-to-date literature and past cases were reviewed. Patients' ages differ from 4 days to 70 years. Our review showed four cases treated with antibiotics, 19 patients went to surgery, and others just followed-up with antiepileptic and other drugs.

Conclusion Literature needs an autopsy series for a more intimate estimation. Due to psychosocial and legitimacy problems, matter should be handled cautiously and law enforcement agencies must be informed. Follow-up with medication is the first line of treatment with asymptomatic patients. Treatment is dictated by clinic onset, physical examination, and patient consent.

Keywords Sewing needle · Brain · Epilepsy · Infancy

Introduction

Intracerebral foreign bodies such as needle, wood, and bullets are generally due to penetrating injuries through the orbit, ear, cranial bones, or rarely forgotten surgical objects in the brain during surgery [9, 34]. Most patients were asymptomatic. Patient's rarely presented with headache, altered behavior, and epilepsy.

Sewing needles are the most unusual foreign bodies that may be found in the brain and may be a homicidal attempt in infancy or early childhood before the closure of the fontanels [40].

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Historical background

The occurrence of an intracranial needle is an unusual state that mostly occurs in early childhood as a result of insertion from anterior fontanel with the intent of infanticide [40]. Similar cases are reported from China due to the one-child policy but because of the regime, a newer subject has been emphasized enough. There are varieties of other rarer reasons encountered during the review. According to literature, incidence trauma, accidental insertions, polygamy, suicide, psychosis, and jealousy are the other causes (Table 1).

In the literature, intracranial sewing needle is mostly seen in the vertex, nostrils, and orbit [16, 22, 48]. Also, the foramen magnum and cranial bones are other rarer insertion points.

Isolated cases of intracranial sewing needles have been reported since 1914 [19].In the literature review, there were

Table 1 Cases of needle insertion

Case	Age at presentation	Number of needles	Probable source	Author	Date	Country
1	4 days	1	Psychopathic mother	Meixner [30]	1914	Germany
2	43 years	2	Stepmother	Meixner [30]	1914	Germany
3	70 years	1		Haun [24]	1927	Germany
4	Infant			Hargatai et al.[23]	1927	Hungary
5	16 months	1	Accident	Gerlach and Jenson [19]	1958	USA
6	29 years	2	Illegitimate brother	Gerlach and Jenson [19]	1958	Germany
7	23 years	1	Unknown	Askenasy et al. [8]	1961	Hungary
8	54 years	1	Unknown	Askenasy et al. [8]	1961	Poland
9	31 years	1	Unknown	Ameli and Alimohammadi [5]	1970	Iran
10	32 years	2	Unknown	Ameli and Alimohammadi [5]	1970	Iran
11	56 years	1	Aunt	Dimitrijevic [15]	1971	Yugoslavia
12				Jovicic et al. [27]	1974	Germany
13				Jovecic et al. [27]	1974	
14				Ishi et al. [26]	1977	Japan
15	24 years	2	Stepmother	Abbassioun et al .[1]	1979	Iran
16	Young man	1	Unknown	Abbassioun et al. [1]	1979	Iran
17	4 months	1	Unknown	Abbassioun et al. [1]	1979	Iran
18	29 years	1	Accident	Barlas and Gökay [11]	1983	Turkey
19	4 months	1	Inserted by brother	Barlas and Gökay [11]	1983	Turkey
20	54 years	3	Unknown, probably neighbors	Buzzi et al. [12]	1987	Italy
21	9 years		Stepmother	Rahimizadeh et al. [36]	1987	Iran
22	21 years			Rahimizadeh et al. [36]	1987	Iran
23	22 years			Rahimizadeh et al. [36]	1987	Iran
24	29 years			Rahimizadeh et al. [36]	1987	Iran
25	55 years			Rahimizadeh et al. [36]	1987	Iran
26	68 years			Rahimizadeh et al. [36]	1987	Iran
27	12 years	1	Unknown	Notermans et al. [32]	1990	Netherland
28	60 years	2	Acupuncture practitioner	Abumi et al. [3]	1992	Japan
29				Prusty et al. [35]	1993	India
30	20 years	3	Unknown	Şener et al. [37]	1997	Turkey
31	27 years	2 + 1	Unknown	Meng [31]	2001	China
32	37 years	2	Unknown	Kazancı et al. [29]	2004	Turkey
33	70 years	2	Acupuncture practitioner	Hama et al. [21]	2004	Japan
34	10 years	1	Unknown, probably in orphanage	Ünal et al. [47]	2005	Turkey
35	45 years	1	Unknown	Tun et al. [44]	2005	Turkey
36	7 years	1	Accidental insertion	Civelek et al. [13]	2006	Turkey
37	29 years	1	Unknown	Sucu and Gelal [41]	2006	Turkey
38	4 years	2	Unknown	Teegala et al. [43]	2006	India
39	32 years	1	Unknown	Tuncer et al. [45]	2007	Turkey
40	10 years	5	Stepmother	Yilmaz et al. [48]	2007	Turkey
41	9 years	1	Unknown	Yolas et al. [49]	2007	Turkey
42	42 years	2	Unknown	Ashrafi et al. [7]	2007	Iran
43	23 years	1	Suicide	Takahashi et al. [42]	2007	Japan

Table 1 (continued)

Case	Age at presentation	Number of needles	Probable source	Author	Date	Country
44	10 years	1	Unknown	Balak et al. [10]	2008	Turkey
45	20 years	2	Unknown	Alp et al. [4]	2008	Turkey
46	81 years	3	Unknown	Sturiale et al. [40]	2009	Italy
47	6 years	1	Homicide	Amirjamshidi et al. [6]	2009	Iran
48	38 years	1	Unknown	Amirjamshidi et al. [6]	2009	Iran
49	25 years	1	Unknown	Amirjamshidi et al. [6]	2009	Iran
50	42 years	1	Unknown	Amirjamshidi et al. [6]	2009	Iran
51	51 years	1	Homicide, stepmother	Amirjamshidi et al. [6]	2009	Iran
52	7 years	4	Unknown	Amirjams.hidi et al. [6]	2009	Iran
53	2,5 months	1	Unknown	Abed et al. [2]	2010	Tunis
54	16 years	4	Unknown	İlbay et al. [25]	2011	Turkey
55	22 years	3	Unknown	Pelin et al. [33]	2012	Turkey
56	24 years	2	Unknown	Mohammadreza et al. [14]	2014	Iran
57	14 years	1	Unknown	Gençpınar et al. [18]	2014	Turkey
58	41 years	2	Unknown	Karadaş et al. [28]	2014	Turkey
59	48 years	1	Unknown	Üçler et al. [46]	2015	Turkey
60	61 years	1	Unknown	Hao et al. [1]	2017	China

five cases from Germany, two cases from Hungary, one case from the USA, one case from Poland, one case from Yugoslavia, 19 cases from Iran, four cases from Japan, two cases from Italy, 18 cases from Turkey, one case from Netherland, two cases from India, two cases from China, and one case from Tunisia. Child abuse is common in the Middle East countries, a cause of this condition is polygamy; ignored first wife tried to kill the children of other wives with the insertion of a needle through the fontanels. In western countries, child abuse was rare and has different causes such as psychopathic mother, infertile stepmother, and alcoholism of parents. In the reported cases from Japan, the cause of intracranial needle insertion was mostly accidentally inserted acupuncture needle by the practitioners.

We carried forward literature review from Sturiale et al. [40]. They reported 40 cases from 1914 to 2009. Our paper added 20 more cases from up-to-date literature and past cases (Table 1). Patients' ages differ from 4 days to 70 years. Gender was not included because of case diversity.

Clinical presentation

Review showed patients mostly found it incidentally. Because of political and sociological ramifications, we do not have accurate numbers of successful infanticide attempts. Literature does not cover every aspect of the subject. Accidents, headache, and epilepsy attacks are most common clinical onsets. In literature, six patients came with epilepsy, two cases had epilepsy and meningitis, one case came with meningitis, one case had hypothalamic syndrome, two cases had hemiparesia, one case came with 6 and 7 cranial nerve paralysis, and primary motor neuron sign was also reported in two cases (Table 2).

Pathophysiological mechanism of seizure related to intracranial foreign bodies is not clear. There are a couple of theories about needles causing epilepsy. Grafman et al. reported persistent epilepsy after penetrating brain injuries as high as 50% at 15 years after injury and 85% in cases with longer follow-up [17, 20]. Balak et al. hypothesized that the needle can function as an electric dipole and can be the main reason for epileptogenesis [10]. Balak et al. and Amirjamshidi et al. analyzed the needles [6]. In conclusion, depending on the material the needle made and the condition it has, some corrosion could be found at the lesion. Also, it has been shown that fibrous capsule isolates the foreign material as a protective layer. Both corrosion and trauma can cause epilepsy by itself.

Diagnosis

Treatment dictated was by clinic onset, physical examination, and patient consent. Also, since most of the cases are

Table 2 Clinical onset, history, and results of needle insertion cases

Author	Clinical onset	Clinical history	Physical examination	Infection	Epilepsy	Treatment	Result
Meixner [30]							Death
Haun [24]		Revealed at necropsy					
Hargitai et al. [23]				+			
Gerlach and Jenson [19]	Headache and epilepsy	Headache for 13 years; epilepsy for 8 years			+		
Askenasy et al. [8]	Convulsion	Epilepsy for 5 years	Normal		+	Surgery	Epilepsy cured
	Headache and vision disturbances	Headache for 2 years	Right inferior homonymous quadrantanopsy			Follow-up	Normal
Ameli and Alimo Hammadi [5]	Headache and hemiparesis	Headache and left hemiparesis for 7 months	Left hemiparesis			Surgery	Hemiparesis improved
	Epilepsy	Seizures and quarrelsome character for 8 years	Normal		+	Surgery	Seizures stopped
Dimitrijevic [15]	Acute headache	Headache for 40 years					
Jovicic et al. [27]							
Ishi et al. [26]							
Abbassioun et al. [1]	Headache	Headache for 7 years	Right hemiparesis			Surgery	Improved
	Incidental detection after trauma	Trauma	Normal			Patient did not continue to follow-up	
	Convulsion and vomiting	Irritability for a week		+	+	Surgery	Cured
Barlas and Gökay [11]	Headache	History of headache	Normal			Follow-up	Normal
	Acute needle insertion	No susceptible history	Normal			Follow-up	Normal
Buzzi et al. [12]	Drowsiness (hypothalamic syndrome)	Obesity, short height, and diabetes since childhood	Hypertension				
Rahimizadeh et al. [36]	Headache					Surgery	Improved
	Headache					Follow-up	
	Epilepsy			+	+	Surgery	Seizure-free
	Trauma	Incidental					
	Trauma	Incidental					
	Transient ischemic attack	Incidental				Surgery	
Notermans et al. [32]	Headache, neck pain, vomiting, left peripheral facial asymmetry	Quarrelsome behavior and slight mental retardation	Left VI and VII c.n. palsy, omolateral face hypoesthesia (V c.n.), and slight stiffness of the neck			Surgery	Complete left VII c.n. palsy, disappearance of left V and VI n.c deficit
Abumi et al [3]	Shoulder stiffness and neck pain	1 year later right upper extremity monoparesia, hypoesthesia	Normal			Surgery	Normal
Prusty et al. [35]							
Şener et al. [37]	Incidental	Headache for a few months	Normal			Follow-up	Normal
Meng [48]	Incidental after trauma		Scalp V-shaped laceration, otherwise unremarkable				
Kazancı et al. [29]	Accident		Normal			Follow-up	Normal
Hama et al. [21]	Accident	Broken acupuncture needle	1 year follow up later left facial paresthesia			Follow-up	Left facial paresthesia
Ünal et al. [47]	Incidental	Headache and vomiting for 1 h	Normal			Follow-up	Normal

Table 2 (continued)

Author	Clinical onset	Clinical history	Physical examination	Infection	Epilepsy	Treatment	Result
Tun et al. [44]	Incidental after trauma		Abrasion at right frontal region, otherwise unremarkable			Follow-up	Normal
Civelek et al. [13]	Acute onset after trauma		Penetration wound at the left eye, otherwise unremarkable			Surgery	Normal
Sucu and Gelal [41]	Incidental detection after trauma		Babinski and Hoffman signs and Achilles clunus on the right side			Follow-up	Disappearance of Hoffman sign after 3 months
Teegala et al. [43]	Incidental detection		Normal			Follow-up	
Tuncer et al. [45]	Seizure	Acute onset	Normal		+	Antiepileptic drugs	Seizure-free with therapy
Yilmaz et al. [48]	Fever, headache, and vomiting	Fever, headache, and vomiting for 3 days	Bilateral papillary edema and leukocytosis	+		Antibiotic therapy	Resolution of brain abscesses
Yolas et al. [49]	Seizure attack	Acute onset	Normal		+	Surgery	No epilepsy after 6 months of follow-up
Ashrafi et al. [7]	Acute headache	Headache nausea and vomiting for 4 months	Sharp margin of optic discs and left Babinski sign			Corticosteroids and NSAID	Uneventful after 2 years
Takahashi et al. [42]	Suicide	Schizophrenia, suicide attempt	Bil. paraparesis, hyperhidrosis, respiratory irregularities			Surgery	Improved
Balak et al. [10]	Seizure attack	Headache and nausea for 9 years	Normal		+	Surgery	Seizure-free after 1 year
Alp et al. [4]	Left hemichorea		Normal			Follow-up	Continuing to follow-up
Sturiale et al. [40]	Incidental detection after CSH	No susceptible history	Mingazzini sign in both the right superior and inferior limbs, mild cognitive impairment			Follow-up	Good at 16 months
Amirjamshidi et al. [6]	Incidental		Normal			Surgery	Normal
	Headache		Normal			Surgery	Exitus
	Incidental		Normal			Surgery	Normal
	Accident		Paresthesia and headache			Surgery	Normal
	Incidental		Normal			Follow-up	Normal
	Incidental		Normal			Follow-up	Normal
Abed et al. [2]	Nausea/vomiting		Normal			Follow-up	Normal
İlbay et al. [25]	Accident		Normal			Follow-up	Normal
Pelin et al. [33]	Headache		Normal			Follow-up	Normal
Mohammadreza et al. [14]	Dizziness		Normal			Follow-up	Normal
Gençpınar et al. [18]	Epilepsy		Normal		+	Surgery	Same
Karadaş at el. [28]	Headache		Normal			Follow-up	Normal
Üçler et al. [46]	Headache		Normal			Follow-up	İmproved
Hao et al. [1]	Dizziness		Normal			Follow-up	Normal

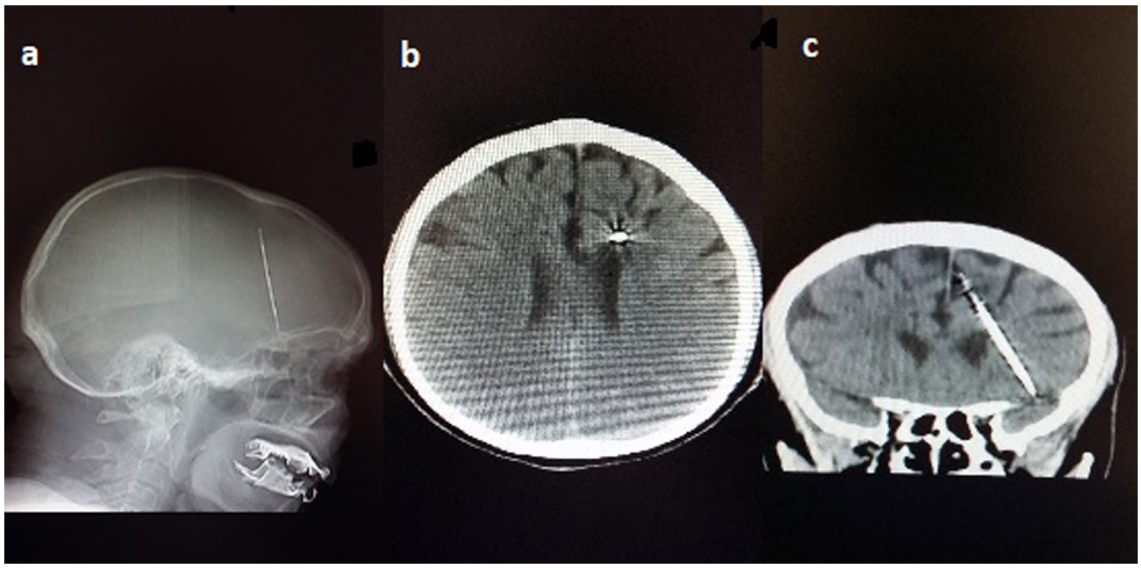

Fig. 1 **a**–**c** Lateral cranial direct computerized tomography showing a sewing needle located in the left frontal lobe of the brain

suggestive of child abuse, taking whole body X-rays and examination are mandatory [6]. If vascular injury is suspected, computed tomography or digital subtraction angiography must be performed. Even if first scan is negative, a scan should be repeated three weeks later in order to diagnose pseudo-aneurysms [39]. In addition, patient must be informed about magnetic resonance imaging (MRI) contraindication.

Management

The most widely accepted approach is to follow-up without surgical removal when the patients have no clinical symptoms or signs. Surgical treatment may be necessary on documented cases with epilepsy, infection, and neurological deficits, but surgical intervention itself may cause epileptic attacks [38].

There are no clear guidelines regarding the management of the brain foreign bodies, follow-up with antiepileptic treatment before surgery might be a reasonable approach to the patients with seizure. Clinical onset varies from coma to asymptomatic patient. As such, treatment varies too. Our review showed one case with infection treated with antibiotics and other two cases with infection and epilepsy were operated, five cases with epilepsy were operated and one case treated with antiepileptics, two patient with hemiparesia went to surgery, one patient with paresthesia was operated, one case went to surgery due to nervus abducens and nervus facialis paralysis; in total, 19 patients went to surgery, and others just followed-up with antiepileptic and other drugs (Table 2).

Prognosis and outcomes

First cranial sewing needle report is made by Meixner from Germany [30]. He described two cases with sewing needle in 1914 and one of them was dead. Most cases are reported by both Rahimizadeh et al. and Amirjamshidi et al. with six cases. All patients were from Iran. Among them, one patient developed akinetic mutism because of possible vascular insult after surgery and died [6]. Most needles found in the brain, reported by Yılmaz et al. with 5 needles, were inserted possibly by the stepmother through the anterior fontanel [48]. A 10-year-old patient developed brain abscess and was followed-up with antibiotics. The abscesses of the patient were resolved. Two cases reported dead and both of them were mentioned above. One case reported by Notermans et al. showed migration of needle. Needle inserted through the anterior fontanel and was trapped 3 cm dorsal to the clivus. When the child was 6 years old, the needle migrated to the dorsum of spinal cord. That case showed migration through the intracranial compartment [32]. One of the interesting material in the brain was an acupuncture needle. There are two cases described by Abumi et al. and Hama et al. in the literature [3, 21]. Both cases happened by accident during acupuncture practice. Abumi et al. removed a needle via surgery but Hama et al., because of patient age and surgical complications, followed patient with left facial paresthesia. There are other materials found in the brain reported in the literature such as Harrington rod, iron rod, and surgical equipment but we focused on the needle subject. Also, surgical clips and forgotten cotton may cause granulomas in the surgical field [1]. After surgical and medical procedures, it was reported that emboli arising from catheters, sutures, and atheroma plaques may reach the brain [1].

In literature review, four patients with epilepsy and two patients with epilepsy and infection who underwent surgery

were improved, one patient with epilepsy treated medically was seizure free, and one patient was operated due to epilepsy but epileptic attacks were continued. Two patients with hemiparesia were operated and symptoms were improved, one patient with headache was operated, but after the operation, the patient was dead. The other cases in literature who have no serious symptoms were followed-up and not seen with any complications.

Exemplary case description

A 54-year-old man was admitted to our neurosurgery outpatient department with epilepsy. Patient's physical and neurological examination was completely normal. There was no previous history of epileptic seizures, head trauma or injury, and his family history was unremarkable. All biochemical and hematological tests were normal. Cranial tomography demonstrated a linear density at the left frontal lobe compatible with a sewing needle (Fig. 1). The patient and his family had no idea how the needle was introduced into the brain. Due to the position and location of the needle, we thought it might have been inserted through the anterior fontanel during infancy. Electroencephalography (EEG) was normal. Levetiracetam 1000 mg daily treatment was begun. During a 2-year follow-up, he was seizure-free with levetiracetam treatment. No surgical procedure was applied because he had no clinical symptoms and remained seizure-free in the follow-up period. At the end of 2 years, anticonvulsant therapy was terminated. The patient followed another 2 years and during this period no seizure occurred.

As mentioned above, primary cause of the needle in the brain is infanticide attempt. This reality comes with some psychosocial and legitimacy problems. According to current patient rights perspective, we should inform the patient, family, and legal guardian about the extent of the situation. Also, we should report the patient to law enforcement agencies. Because of unpredictable reactions and causes, subject must be handled cautiously.

Conclusion

This review shows lack of literature knowledge of the subject. Because of sociological ramifications, politics, asymptomatic patients, and many infants die without diagnosis and phenomenon remained ambiguous. Literature needs autopsy series for a more intimate estimation. Due to psychosocial and legitimacy problems, matter is handled cautiously and law enforcement agencies must be informed. Follow-up with medication is the first line of treatment with asymptomatic patients. Surgery must be evaluated with patient, family, or legal guardian according to onset and examination. Patients with epilepsy, infection, and neurological deficits are candidates for surgery.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Patient consent The patient has consented the submission of the case report for submission to the journal.

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