

Situs Inversus Totalis: A Case of Incidental Autopsy Finding and Review of Literature

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Abstract

'Situs inversus' is a congenital anomaly where the normal physiological positions of the thoracic and abdominal organs are reversed giving an appearance of a perfect mirror image of the normal anatomical position of the organs. An individual with 'Situs inversus' usually remains asymptomatic throughout life. The diagnosis is usually made out when the individual seeks medical attention for some unrelated condition. An autopsy case of suicidal poisoning is reported where the rare phenomenon of 'complete situs inversus' was observed as an incidental finding. The issues of medicolegal significance associated with this anomaly are highlighted along with review of literature.

Keywords: Situs inversus totalis; Congenital anomaly; Autopsy; Poisoning.

Introduction

'Situs inversus' is a congenital anomaly where the normal physiological positions of the thoracic and abdominal organs are reversed giving an appearance of a perfect mirror image of the normal anatomical position of the organs.[1] The term 'situs inversus' derives its origin from the Latin phrase '*situs inversus viscerum*', which translates to 'inverted position of the internal organs'. In this condition the organs rotate in the sagittal plane resulting in the reversal of abdominal and thoracic organs without any alterations in the anteroposterior relationships. The neurovascular and lymphatic systems may also accompany the changes observed in the respective organs. The phenomenon of 'situs

inversus' can be complete or partial, the determining factor being the direction of the apex of heart. Thus, if the apex of the heart is directed towards the right side it is deemed as 'complete situs inversus' or 'Situs Inversus Totalis' and if the apex is in its normal anatomical position, it is called as 'partial or incomplete situs inversus'. Situs inversus, though may appear as a grossly abnormal condition, it does not affect the normal life of an adult and mostly remains asymptomatic. The diagnosis is usually made out when the individual seeks medical attention for some unrelated condition.[2]

An autopsy case of suicidal poisoning is reported where the rare phenomenon of "complete situs inversus" was observed as an incidental finding. Relevant literature is reviewed to highlight on the issues of medicolegal significance associated with this anomaly.

Case Summary

Dead body of a 66 year old male was brought for medicolegal autopsy at our centre. Preliminary police investigations revealed that the deceased had committed suicide by ingestion of an insecticide. Report from the Regional Forensic Science Laboratory (RFSL)

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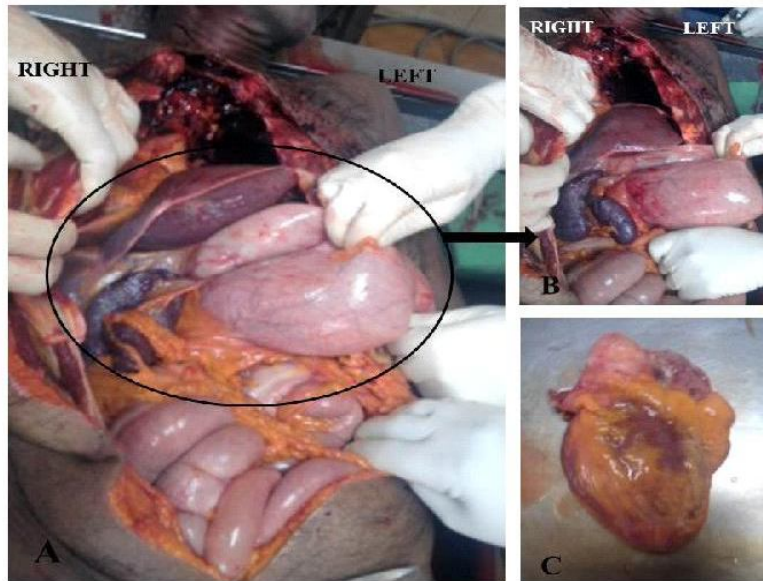
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Figure 1: Complete Reversal of Thoracic and Abdominal Organs. Apex of the Heart is Pointing to the Right Side. Liver is Present on the Left Side. Stomach that was on the Right Side is Lifted to show the Underlying Spleen Located on the Right Side (Figure 1 A and B). Figure 1 C shows the Posterior Aspect of Heart



confirmed it as a case of organophosphate consumption. Exact reason for committing suicide was not known. The deceased was a diabetic and investigators believed that he took the extreme step owing to the long standing illness. The deceased survived for approximately 4 hours post insecticide ingestion and autopsy was conducted within 24 hours of his death. During autopsy, it was observed that the deceased was moderately built and nourished. No external injuries were present on the body. Frothy blood mixed fluid was seen coming out of mouth and nostrils. External examination otherwise, was unremarkable. On internal examination, complete reversal of thoracic and abdominal organs was observed. Bilobed and trilobed lungs were present in the right and left pleural cavities respectively. Apex of the heart was pointing to the right side. Liver was present on the left side. Stomach was on the right side and is lifted to show the underlying spleen located on the right side (Figure 1 A and B). Figure 1 C shows the posterior aspect of heart. Right and left lungs weighed 860 grams and 660 grams respectively. Thoraco-abdominal organs were congested.

Discussion

Suicide is an important public health hazard worldwide and elderly men are at higher risk of suicide than women.[3] Poison is a common method of committing suicide in the region.[4] It is observed that insecticides are responsible for most of the suicidal fatalities.[5,6] The present case is another in the series of elderly men who commit suicide by ingestion of insecticides.

Situs inversus totalis is a rare anomaly with an approximate incidence of one in 10,000 to 20,000 among the general population.[7] The condition is asymptomatic and individuals are unaware of this anomaly. The diagnosis of situs inversustotalis is usually accidental. In most cases, situs inversus is diagnosed incidentally during thoracic and abdominal imaging. Isolated situs inversustotalis is reported to be usually asymptomatic in neonates.[8] Situs inversus is known to be a rare autosomal recessive condition. Studies have further observed that situsinversus can be X-linked or even found in identical twins. [9] The etiology of situs inversus is unclear and still being

looked into. The condition is sometimes associated with syndromes such as Kartagener syndrome, cardiac anomalies, and malformations of spleen. Among these, Kartagener syndrome is one of the conditions commonly associated with this anomaly and is characterized by situs inversus, bronchiectasis, chronic sinusitis and infertility. [10]

The condition of situs inversus totalis is associated with diagnostic and therapeutic issues. With regards to its surgical implications, the surgeons are likely to face difficulties due to reverse anatomy during surgeries performed on patients with situs inversus. [11] It is believed that for patients with total situs inversus and cholelithiasis, a left-handed surgeon can carry out the procedure of laparoscopic cholecystectomy more comfortably than a right-handed surgeon. [12] Similarly, issues related to diagnosis and treatment of appendicitis in a patient with situs inversustotalis are discussed in literature. [13] Bajwa *et al* [14] emphasized on the potential difficulties encountered during anaesthetic management and its implications during various surgical procedures in patients with situs inversustotalis.

Acute traumatic conditions with medicolegal significance and disorders requiring acute intervention can surprise the surgeon and patient if the condition is not recognized preoperatively. [2] In cases of poisoning, gastric lavage needs to be performed using a right lateral approach. A successful resuscitation of patients with situs inversustotalis will require a detailed knowledge and skills of applying direct current with defibrillator pads on the right side. [14] Organ transplantation is another challenge associated with this congenital anomaly. Situs inversus is considered as a contraindication for thoracic transplantation as reconstruction of the mirror-image systemic venous pathways to accommodate normal donor organs remains the main difficulty for the surgeons. [15]

Issue of misdiagnosis, wrong diagnosis or complications during diagnostic or therapeutic

procedures can bring about allegations of medical negligence. Thus, the importance of correctly identifying this condition is emphasized on. Imaging techniques such as radiography, ultrasonography and computed tomography can confirm its diagnosis and reduce the likelihood of misdiagnosis/ wrong diagnosis. In developing countries with limited access to more advanced imaging techniques especially in rural populations, doctors working at primary health centres should be aware of this condition and thorough a clinical examination with percussion and auscultation of chest and abdomen can be helpful in its diagnosis. The most commonly available and cost effective investigation to confirm diagnosis in such cases will be a chest or an abdominal radiograph.

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