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History

Pediatric neurosurgical techniques in the 15th century

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Abstract

The renowned Turkish surgeon Şerefeddin Sabuncuoğlu (1385–1468 AD), delineates management of various pediatric neurosurgical diseases such as head trauma, spinal trauma, and intrauterine and infantile hydrocephalus, as well as basic surgical principles in his textbook *Cerrahiyyetü'l Haniyye*, which consists of three chapters dealing with a variety of surgical specialities. The sections on neurosurgery are still relevant to modern medicine. The book combines previous knowledge of Greek, Roman, Arabic, and Turkish surgery. Today, Sabuncuoğlu is recognized as a pioneer of pediatric neurosurgery.

Keywords: Şerefeddin Sabuncuoğlu; *Cerrahiyyetü'l Haniyye*; Pediatric neurosurgery; 15th century; Ottoman period

1. Introduction

The Turkish surgeon Şerefeddin Sabuncuoğlu (1385–1468 AD) was born and practiced medicine in Amasya, an ancient city located in northern Anatolia.[1–8] *Cerrahiyyetü'l Haniyye [Imperial Surgery]*, written in Old Turkish in 1465 by Sabuncuoğlu at the age of 80, includes colored illustrations and descriptions of reduction techniques and surgical therapies, including incisions and cauterization procedures for the management of various neurosurgical diseases.[1,2,6,7,9,10] Furthermore, the colorfully miniaturized and illustrated textbook includes definitions of certain surgical diseases and their etiologies, and descriptions of various surgical instruments, from a wide range of surgical specialities, including pediatric neurosurgery. There are only three original handwritten copies of the book, in existence, one in the Bibliotheque Nationale in Paris[4] and the other two in the Fatih Millet Library and the Department of Medical History of the İstanbul University Medical School in İstanbul.[5,11] In 1992, Uzel wrote an in-depth review of the book.[7] The aim of the present report is to describe the contributions of Sabuncuoğlu to pediatric neurosurgery in the 15th century Ottoman period.

2. Pediatric neurosurgical techniques

Sabuncuoğlu was interested in the surgical treatment of various pediatric neurological disorders, including craniospinal trauma, and intrauterine and infantile hydrocephalus. In his book, Sabuncuoğlu beautifully illustrated some of his patients, which are referred to as "oglancuk" in Turkish, meaning "child" or "young adolescent", in different sections of the book. He also described novel instruments that could be used during various pediatric neurosurgical procedures. Moreover, he provided some information about surgical cauterization for headache, epilepsy, and sciatica in his surgical atlas.[6,7]

3. General surgical principles in pediatric neurosurgery

Sabuncuoğlu mentioned the importance of the prevention of sepsis during various surgical procedures before the development of sterile technique and modern anesthesia.[1,7,8] He used a combination of mandrake root and almond oil for pediatric analgesia and anesthesia and recommended surgical dressings involving antiseptic wine and olive oil.[1,7,8,12] In his surgical textbook, Sabuncuoğlu said:

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In some patients, there may be a resistance during surgical incisions and cauterization procedure … and an operation may be done using a narcotic drug called murkid … it must be given in the amount of one drachm orally for adults … then you can accomplish the procedure without any problem. However, you should give only the amount required in children to prevent a malpractice. During my life I did not need any other anesthetic drug.[7,12]

4. Surgical techniques for pediatric head trauma

In Section 2 of Chapter 3 of Sabuncuoğlu's book there is some information about the treatment of head trauma in young children caused by falling.[7] Sabuncuoğlu said:

In some cases, there is a skull fracture but no sign can be determined on routine examination of the scalp. In this case, the fracture line is in the shape of a hair and … There is another type of fracture: it happens as a result of bumping the head with a hard material like a stone or as a result of a strike on the head with a material like this. In these events, the skull was sunken and hollow just like the gnarling of a copper tool after hitting it with a hard material like stone. This kind of head trauma frequently occurs as a result of the softness of the bones in children. Sometimes the skull may be broken into small pieces, but the pieces don't separate from one another … By careful inspection of the wounds as mentioned above, you should remove the soft and spoiled tissues within the wound. … Following the elevation of the soft tissues over the fracture line and the determination of the broken bone, you should pour ink on the bone to determine the size of the bone defect, with the permission of Allah.[7,13]

Following this he also described the treatment method of skull fractures and instruments used in his surgical textbook, as follows (Fig. 1):

If the skull fracture affects the membrane over the brain, the fractured pieces of the bone should be cut and removed. Different types of tools have been used for this process. The method of removing a small piece of bone is as follows: the patient's hair should be cut and the swelling on the bone should be opened properly without frightening the patient. If there is too much blood shedding during the process, you should do necessary applications quickly on this section to staunch the blood. If the swelling continues, you should cover the wound with an old cloth dipped in wine and attar of roses so that blood can coagulate and stop flowing. Then you should continue to carve the bone and to remove the pieces of the bone. There are two ways of removing the bone after cutting: the first way is by cutting the bone using a cutting device with a thin edge such as a mikta … If the skull surrounding the fracture line is hard, you should make a hole using a drill. The surface of this drill is very short and there is a button in the neck of the device so that during the opening of the hole, this button prevents any overpenetration of the drill into the brain tissue. … There are three types of drills … Be careful: you should turn the drill device called a miskab after placing it in the centre of the fractured bone until it makes a hole and the tip of the drill comes out from the outer side of the skull bone. Then, first you should lift up the miskab and open an additional burr hole in another region of the wound. You should cut the intervening bone between these two holes as shown above with a cutting device called a mikta and, if you are strong enough, by your hand or a thin tool like pincers, you should tear the whole bone. Nevertheless, during these procedures, you should prevent the drill and cutting device from touching the brain tissue … You should cut the intervening bone between two burr holes on the skull using a mikta whose one face is the same as the face of a knife and other face is the same as the back of a knife. You should place its sharp face upon the skull bone and then you should strike it with a small hammer. You should continue the process slowly until you cut the whole skull bone.[7,13]

Fig. 1. Surgical instruments called "mikta" (left) and "miskab" (right) used for cutting the fractured fragment of an infant's skull and drilling an infant's skull, respectively. Note that each of these surgical instruments is depicted in three sizes: small, medium, and large. Reprinted with permission of the Atatürk Institute of Culture, Language and History, Institute of Turkish History.[7]