

Key Points

1. Whether to remove, or burn away, the cerebellar tonsils as part of surgery is very controversial
2. Some surgeons believe it is beneficial in creating adequate space for CSF flow
3. Others argue that removing brain tissue unnecessarily is risky
4. This study performed a microscopic analysis of cerebellar tonsil tissue removed from 43 patients
5. Found that overall 38 out of the 43 were abnormal; 5 were normal
6. The most common finding was a loss of Purkinje cell; there were also signs indicative of neuron damage
7. No common link was found between the five healthy cases
8. Authors believe that in most Chiari cases, the cerebellar tonsils are damaged and abnormal and removing them has not had any negative effects on their patients

Definitions

ataxia - loss of coordination

cauterize - to burn tissue with heat

gliosis - an accumulation of certain types of cells in the brain which is usually associated with neuron damage

histological - having to do with the analysis of cells and tissue using a microscope

neuron - main type of brain/nerve cell which send and receives information via electrical pulses

pathological - having to do with the study of abnormal tissue

Purkinje cell - large type of neuron which is found in a layer in the cerebellum; Purkinje cells form many complex connections with

Cerebellar Tonsils Removed During Surgery Abnormal

January 31, 2007 -- The very first issue of Chiari & Syringomyelia News reported on a surgical technique which was intended to minimize the trauma associated with the surgery for children. The article, which remains one of the most popular on the website to this day, described the technique and results of Dr. Jorge Lazareff, a pediatric neurosurgeon at UCLA.

At the time, in an attempt to reduce both the surgical trauma for pediatric patients and the risk of later complications, Dr. Jorge Lazareff, utilized a surgical technique which focused only on the malformation itself by removing the cerebellar tonsils and preserving as much bone as possible. He reported good results on a small number of pediatric Chiari patients and thought that recovery was easier for the children because of the reduced surgical trauma.

As popular as the article was (and is) with our readers, its underlying subject matter was just as controversial in the surgical community. In an editorial in the same journal in which the article was published, Dr. Oldfield, a neurosurgeon at the National Institutes of Health, expressed concerns with the procedure. According to his editorial, Dr. Oldfield believed the procedure proposed by Dr. Lazareff violates the basic principal of neurosurgery, which is to preserve neural tissue like the brain, at the expense of other tissue, like bone. In addition, Dr. Oldfield believed that the scarring that may result from this procedure has the potential to block the flow of cerebrospinal fluid and could cause syringomyelia in and of itself.

Disagreement among surgeons is nothing new, and there are almost as many variations of Chiari surgery as there are surgeons performing them, but the issue of whether to manipulate (a euphemism for cauterize or resect) the cerebellar tonsils is one of the most controversial and one which every patient should have an opinion on. One neurosurgeon told Chiari & Syringomyelia News that while he believes in opening the dura, he does not touch the tonsils because he can not say for sure what impact that might have on a patient's functionality.

On the flip side, according to a survey of pediatric neurosurgeons, as many as 30% manipulate the tonsils to some extent during surgery. This obviously translates into a significant number of patients each year, so one would expect that if removing part or all of the cerebellar tonsils had a severe, negative effect, it would be well known by now.

At the time his research was first published, Dr. Lazareff, who holds an endowed chair and is the director of pediatric neurosurgery at UCLA, answered his critics by pointing out that the tissue being removed was likely abnormal from the tonsils being forced into and compressed in the spinal area. Now, in a report published in the journal *Children's Nervous System*, Dr. Lazareff presents evidence that this is indeed the case.

Dr. Lazareff, and colleagues from UCLA, microscopically examined cerebellar tonsil samples removed during surgery from 43 Chiari patients. The patients ranged in age from 4 months to 20 years and there were 22 males and 21 females. The researchers found that indeed in nearly 90% of the cases, the removed tissue could clearly be classified as abnormal (see Table 1).

In 32 of the cases, the tissue demonstrated what is known as Purkinje cell loss (see Figure 1 below).

Figure 1: Normal versus Damaged Cerebellum

other cells

resect - remove surgically, cut out

tonsillectomy - in the context of Chiari, refers to removing the cerebellar tonsils surgically

Common Chiari Terms

cerebellar tonsils - portion of the cerebellum located at the bottom, so named because of their shape

cerebellum - part of the brain located at the bottom of the skull, near the opening to the spinal area; important for muscle control, movement, and balance

cerebrospinal fluid (CSF) - clear liquid in the brain and spinal cord, acts as a shock absorber

Chiari malformation I - condition where the cerebellar tonsils are displaced out of the skull area into the spinal area, causing compression of brain tissue and disruption of CSF flow

decompression surgery - general term used for any of several surgical techniques employed to create more space around a Chiari malformation and to relieve compression

Source

Pueyrredon F, Spaho N, Arroyave I, Vinters H, Lazareff J. Histological findings in cerebellar tonsils of patients with Chiari type I malformation. Childs Nerv Syst. 2006 Nov 22; [Epub ahead of print]

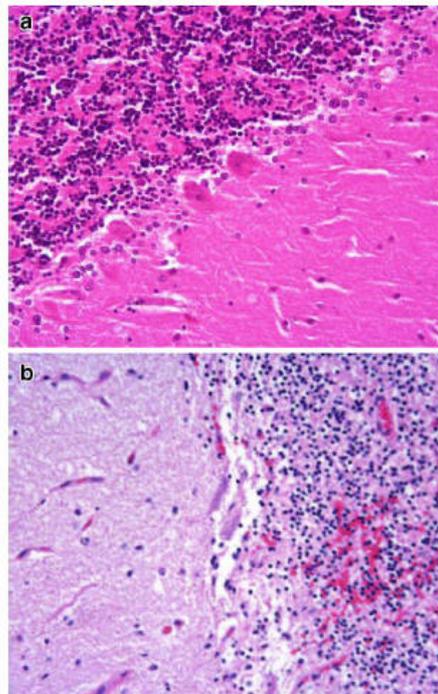


Fig. 1 a Fragment of normal cerebellum. b Severely sclerotic fragment of cerebellum with complete Purkinje cell loss

Purkinje cells are large neurons which are arranged like dominoes in a layer in the cerebellum. In addition, Purkinje cells have numerous and complex connections with each other and other brain cells. PCL is found in a number of degenerative brain disorders and when brain tissue is deprived of oxygen.

In six of the abnormal cases, gliosis was the primary finding. Gliosis is an accumulation of a certain cell type which is strongly indicative of neuron damage. Interestingly, the researchers could not find any common trait among the 5 cases which were considered normal and offered no thoughts on why some would be normal while most were not.

Given the results, the authors believe that the damage seen to the cerebellar tissue is most likely due to the compression associated with the tonsils being jammed into the spinal area. And while they clearly state with their report they are not advocating tonsillectomy for Chiari surgery, they do continue to perform the procedure for their patients with good results and with this study appear to have answered their critics.

Table 1
Pathology Findings Of Cerebellar Tonsils Removed During Surgery (43 Samples)

Finding	Number
Purkinje Cell Loss (PCL)	32
Gliosis	6
Normal	5

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