

THE OCCASIONAL NECESSITY OF DOING RADICAL
OPERATIONS ON THE PARANASAL SINUSES
IN CHILDREN, WITH REPORT OF CASES.

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With rather considerable experience in treating paranasal sinus disease in infants and young children, we have found it only very rarely necessary to perform extensive operations upon the paranasal sinuses.

We have found that much more readily than in the adult the chronic infections of the sinuses yield to simple treatment. Approximately eighty per cent of our cases have been apparently cured by the removal of adenoids and diseased tonsils. It is noteworthy that in no instance where the hemolytic streptococcus was the bacteriologic factor, has healing resulted from this procedure.

In those cases where the removal of tonsils and adenoids has not produced a cure, rather mild treatments with or without drainage and ventilation of the sinuses, have, as a rule, produced satisfactory results.

Some six months ago, in discussing the infections of the paranasal sinuses in infants and young children, we expressed the opinion that with children we would never do an operation on the maxillary antrum through the incisor fossa. Since then we have operated upon two cases by this route. We are firmly convinced that the exigencies of the situations and the results justified the procedure.

In doing these operations and also extensive operations on the upper posterior paranasal sinuses, we have not lost sight of the deleterious influence upon the development of the bones of the face that may result from the destruction of these cells in young children. We have always held prominent the very important functions of the nose and only as a very last resort

have injured structures that are essential to the performance of these functions.

We have had to deal with children with infectious arthritis involving practically every joint in the body, including the temporomandibular. This condition has progressed in spite of the removal of the tonsils and adenoids, drainage and ventilation of the paranasal sinuses and their treatment. We knew the ultimate outcome of this condition unless checked, namely, ankylosis of the joints with utter helplessness and death.

When we have had this condition to deal with and have proved conclusively that there was present in a paranasal sinus a virulent organism which when injected into an animal produced arthritis, and with prolonged treatment we have not been able to eradicate this organism from the sinus, then remembering the facts above stated, and after a most careful study of the case we have proceeded with extensive operations. We have made every effort to preserve essential structures. In each instance the inferior turbinate has been sufficiently retained to carry out its function. It has been necessary in certain instances to sacrifice the middle turbinate. We have realized the very great need of preserving as intact as possible the inferior turbinate when the upper has been sacrificed. In this we have been very successful.

We are glad to report that where a Denker operation on the Highmorean antrum has been performed, all the teeth have remained vital.

The principal result of these operations has been the apparent healing of the sinus disease. The structures have no longer served as foci of infection. The joints have become quiescent; the pain in them has disappeared; the temperature curve has returned to normal; and, what is perhaps more important, the appearance of the patient has improved.

There is about these children, after the removal of the focus and the checking of the infection, something which is hard to describe. The listlessness which was so marked, and the expression of pain and depression disappears, and the child becomes bright and happy. The weight improves; the child enjoys play, something which he did not do before. The change is such that it justifies to us any necessary reasonable operative procedure.

Ordinarily we do not like to present case histories, as they are frequently long and tedious. We feel we can only illustrate the conditions we have had to deal with, and make plain the reasons for our doing these operations by presenting two such cases, and asking you to study them with us.

The two cases we are about to relate are two out of three cases from a very large series of arthritis cases in infants and young children, ranging from eighteen months to sixteen years of age, where we have found it necessary to do radical work on the paranasal sinuses. We have prepared two charts illustrating the temperature variations while the cases were being studied. Important bacteriologic findings are noted on the charts, as are also operative procedures.

Case 1.—R. F., referred by Dr. Steindler on January 5, 1919, for ascertaining the foci of infection. His diagnosis: Infectious arthritis.

Patient, white male, age 12 years. He is anemic looking; he is very thin; his appetite is poor; he is confined to his bed; he gives the impression of constant suffering. Almost every joint of the body is involved, including the joints of the cervical vertebrae and the temporomandibular articulation. The arthritis has been progressing for over two years. The joints are swollen, reddened and very tender. The pediatricist reports no involvement of the heart or kidneys. His daily temperature ranges from 98.8 to 100.2 degrees. He takes cold easily; he has no nasal discharge or obstruction; he has occasional attacks of sore throat; tonsils twice operated two years ago, resulting in improvement of his rheumatism.

Examination revealed a remnant of faucial tonsil on each side and a fair sized bunch of adenoid tissue in the nasopharynx. Cervical glands not palpable. There was a little mucopus in each side of the nose. The left antrum was blurred in the X-ray plate.

On January 10, 1919, the remnants of tonsils and adenoids were removed; the Highmorean antra were irrigated—the washings were reported sterile. From the tonsils a hemolytic streptococcus, a staphylococcus and the streptococcus viridans was recovered.

A rabbit injected intravenously with 1.5 cc. of a forty-four hour culture of the hemolytic streptococcus developed arthritis

in each shoulder joint. From the synovial fluid in the joints a hemolytic streptococcus was cultured. No gross changes were apparent in any of the internal organs.

The patient was returned to Dr. Steindler for observation, with the request that he be returned for further examination if there seem to be a focus of infection remaining.

On June 4, Dr. Steindler returned the patient to our service. He reported that while the condition of the patient was improved, he still has acute exacerbations of his arthritis, and the daily slight rise in temperature persisted.

Examination of the nose revealed the septum deflected to the left; left antrum of Highmore contained pus so thick it could only with difficulty be aspirated; the washings from the right Highmorian sinus showed no macroscopic pus. The bacteriologic examination of the washings from the sinuses revealed a hemolytic streptococcus from the right Highmorian antrum; a hemolytic streptococcus and a staphylococcus from the left. The hemolytic streptococcus from each fermented lactose and salicin; neither fermented mannite or inulin.

A rabbit was injected intravenously with 3 cc. of a twenty-four hour culture of a hemolytic streptococcus from the left antrum. It developed arthritis in the right elbow joint; also in the left ankle joint. The paranasal sinuses of the animal were negative on culture; the lungs and pleura were normal; there was fibrinous pericarditis; there were parenchymatous changes in the liver; the spleen and kidneys were apparently normal. A hemolytic streptococcus was cultured from the elbow joint.

On May 5, the deflected septum was corrected. The nose was treated, using negative pressure and nasal irrigations of normal salt. Patient was out of doors as much as possible.

Following this operation the patient's general condition improved, but the temperature and joint condition remained as before.

On May 23, the Highmorian antra were drained through the inferior meatus. The inferior turbinates were rotated upwards, and an opening made in the antromental wall. The turbinates were replaced and the operation completed without sacrificing any inferior turbinate tissue. The Highmorian antra were irrigated with sterile normal salt solution followed

by 1 per cent argyrol daily, and occasionally with 5 per cent silver nitrate solution.

One month later, on June 21, the patient insisted that the joints were better. His daily elevation of temperature to 100° persisted, however, and the appearance of the patient was bad. He had developed a bed sore which caused much distress. There was only a little discharge from the Highmorian antra.

At this time pus was detected coming from the region of the left sphenoid. The lingual tonsil had been frequently examined—it always appeared normal.

On June 23, 1919, the left sphenoid and left anterior and posterior ethmoids were operated. The sphenoid and ethmoids were badly diseased. The walls of the sphenoid were rough. A polyp was removed from the anterior ethmoid region. It was covered with columnar epithelium; it contained mucous glands; it was distinctly inflammatory, as shown by the large number of round cells below the basement membrane and around the blood vessels and glands; it was very edematous; the connective tissue cells have undergone mucoid degeneration. A very careful examination failed to reveal any definite evidence of involvement of the upper posterior sinuses on the right side. Consequently they were not disturbed. The nose was treated daily.

On August 23, the patient reports he is feeling fine; he can move his head better; the joints are not painful; there are no evidences of acute trouble in the joints. However, the patient looks bad; he gives the impression that he is gradually failing; daily afternoon temperature is between 100 and 100.4 degrees. The ethmoid and sphenoid regions are perfectly clean. The opening into the Highmorian antra are patent. Some mucopus is present each morning in washings from the antra. The washings still contain the hemolytic streptococcus.

On August 25, a Denker operation was performed on each Highmorian antrum.

Findings in the right antrum: Caries of the floor. Mucous membrane much hypertrophied. Three good sized polyps were removed. The polyps showed mucoid degeneration and marked purulent inflammatory changes.

The findings in the left antrum were similar to those of the right.

A hemolytic streptococcus was secured from each antrum. A rabbit inoculated with 4 cc. of culture twenty-four hours old became ill; it would not eat for two days; it gradually recovered; no arthritis was noted.

Following this operation the patient improved wonderfully. The temperature in five weeks became normal and has remained so except for the usual exacerbation present in bedridden cases in the children's ward.

His appearance has changed; he now looks well; he enjoys himself; his appetite is good.

The joints are quiescent; pressure on them does not elicit pain. Movements in the joints have increased spontaneously.

On November 26, he was transferred back to the orthopedic ward for the usual treatment for quiescent ankylosed joints. The sinuses are apparently well.

All of his teeth are vital. The only damage done to his nose is the removal of the left middle turbinate.

Case 2.—C. M., referred by Dr. Steindler on February 11, 1919, for finding the foci of infection. His diagnosis: Infectious arthritis. (See photograph.)

The trouble began during the preceding summer without apparent cause. The first thing noticed was a gradually developing of stiff knees with some tenderness. In December last, following influenza, the ankles and elbows became involved; the knees began to swell and were tender. The patient is now unable to stand on his feet because of pain in the ankles.

The patient is a white male, age thirteen years. He is confined to bed; he looks very bad, giving the impression of constant suffering. Almost every joint in the body is swollen and painful on pressure. The temporomandibular joints are involved so that the incisor teeth cannot be separated more than one-half inch. The cervical vertebræ are ankylosed, the head being fixed tilted to the left, with the chin pointing to the right. The daily range of temperature is from 98.8 to 101.2 degrees. The patient has no sore throat, hoarseness or cough. At times there is a slight cervical adenitis on the left side. No history of easily developing an acute rhinitis

or of nasal obstruction. There is considerable nasal discharge.

Examination: Nose, small spur right and left. Mucopus in each side of the nose; cannot be detected as coming from any definite region.

X-ray: Shows the Highmorian antra blurred—other sinuses clear.

Washings from antra, right, discarded because of an error in technic. Left, sterile.

Throat, chronically diseased tonsils—moderate sized adenoids.

Diagnosis: Chronic tonsillitis and adenoids with sinus disease not definitely diagnosed.

It was recommended that the tonsils and adenoids be removed and the patient placed under observation.

On March 18, the tonsils and adenoids were removed. From the tonsils a hemolytic streptococcus was secured.

On April 12, the patient developed an acute exacerbation of his arthritis and a second search for foci of infection was made. The daily elevation of temperature had been constant. The lingual tonsil appeared reddened; this seemed to be just a part of the general inflammation of the throat.

The nasopharyngoscope showed the neighborhood of the ostia of the upper posterior sinuses to be edematous and reddened. No pus could be seen coming from the sphenoids or posterior ethmoids.

Washing and aspiration of Highmorian antra gave from the right a bloody fluid; from the left, mucopus. Cultures from the right antrum were sterile; from the left, a hemolytic streptococcus was secured. Two cubic centimeters of a forty-eight hour culture injected intravenously into a rabbit developed in four weeks arthritis of the ankle joints.

An opening for ventilation and drainage was made through the inferior meatus into the Highmorian antra. The after-treatment was irrigation with sterile normal salt, followed by argyrol 1 per cent; occasionally 5 per cent silver nitrate was used. Coffin's treatment was given twice daily.

Two weeks following the operation the patient was no better; his appearance was bad; the daily afternoon elevation of temperature from one to one and one-half degrees persisted.

On April 30, the upper posterior sinuses were again examined. Mucopus, very thin, was found draining from each sphenoid region, along the posterior border of the septum. About the sphenoid openings the membrane was thickened and there were numerous petechial hemorrhages. There were some flakes of pus secured from each Highmorian antrum. Cultures from each antrum and the superior meatus on each side of the nose gave a hemolytic streptococcus.

Rabbits inoculated intravenously with 3 cc. of a twenty-four hour culture of the organism from the antra produced arthritis of the knee and shoulder joints. The hemolytic streptococcus was recovered from these joints.

On May 1, the sphenoids and posterior ethmoids were drained as thoroughly as possible without removing the middle turbinates, and the openings into the antra were enlarged. There was pus in each sphenoid. The after-treatment was the same as before. The patient developed an ear infection which complicated the situation for several weeks.

The diet was carefully watched and the patient was out in the sun on all favorable days.

A purulent discharge persisted from the sphenoid and ethmoid region.

On June 18, a hemolytic streptococcus secured from the Highmorian antra produced arthritis in a rabbit.

The patient's condition was gradually improving, but the daily elevation of temperature persisted, showing that the process was not checked.

On July 21, the patient developed an acute pharyngitis. The upper posterior sinuses were discharging mucopus.

On July 23, a Sluder operation was performed on the ethmoids and sphenoids on each side of the nose. It was found necessary to sacrifice the middle turbinates. Tissue removed from the ethmoid region showed increase in cellularity; many wandering cells, lymphocytes and polynuclear cells. Most of the surface was covered with columnar epithelium; at some points stratified squamous; and in some areas the surface is denuded of epithelium and covered with pus cells.

In four weeks the upper sinuses were clean, but the antra of Highmore still contained the hemolytic streptococcus.

On August 24, the patient was much improved; afternoon

rise of temperature to 100° persisted; sphenoid regions clean; some pus in each Highmorian antrum.

On August 27, a Denker operation was performed on each side and the lingual tonsil was cauterized.

Polyps and necrotic bone was found in each antrum. A rabbit injected with a hemolytic streptococcus secured from the antra of Highmore developed arthritis.

In six weeks the nose and sinuses were clean; the temperature was normal; the joints much improved. The patient has increased much in weight and says he is feeling fine. He spends much of his time playing.

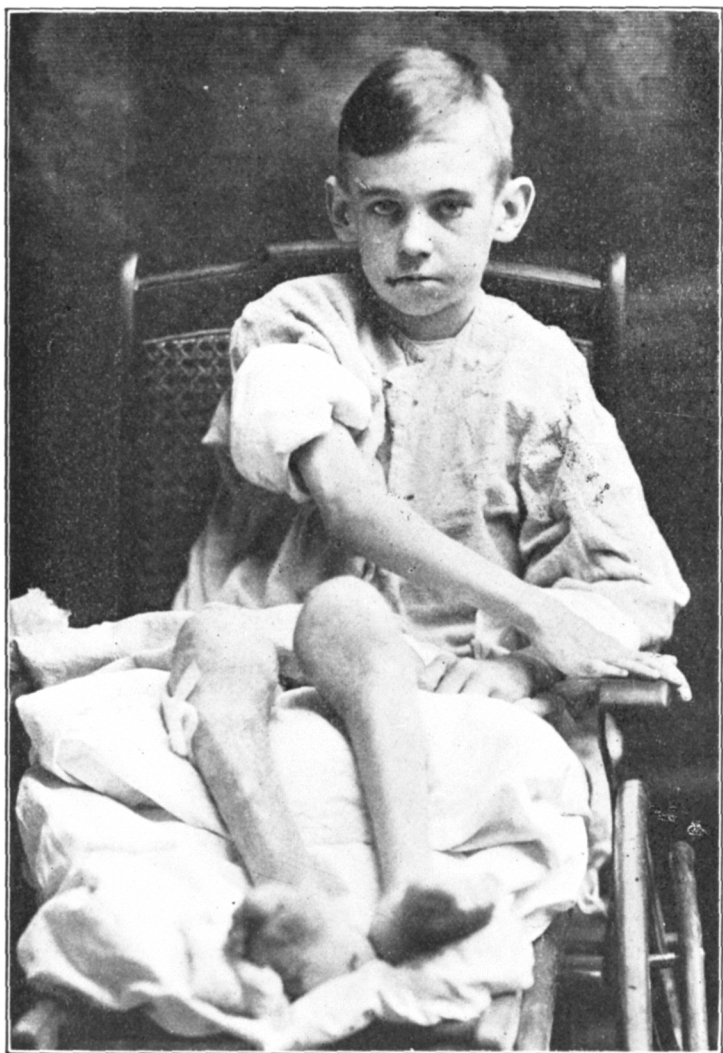
From October 1 to November 28, there was no trouble in the nose or throat. The joints continued to improve.

On November 28, there was no tenderness of the joints on pressure, and the patient was returned to the orthopedic service, for the treatment of ankylosed joints.

Each of these cases had a negative Von Pirquet reaction. From each, material from the sinuses was injected into guinea pigs and no tubercular lesions resulted.

CONCLUSIONS.

1. Every case of arthritis in children that does not do well after the tonsils and adenoids are removed should have the paranasal sinuses examined, even if a previous examination has been negative.
2. If after nonoperative or operative treatment of the paranasal sinuses a focus of infection apparently persists in the sinuses, virulent pyogenic organisms should be sought in the sinuses, and if found more drastic treatment should be instituted.
3. If after careful prolonged study it is evident that only extensive operations will remove the focus of infection, then and then only should they be performed.



Case 1.—R. F.



Case 2.—C. M.