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OBSERVATIONS ON THE PROETZ DISPLACEMENT THERAPY IN SINUSITIS
A DEMONSTRATION OF THE TECHNIQUE

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In 1926 the original contributions dealing with displacement in the diagnosis and treatment of sinusitis were made almost simultaneously by Proetz and Frazer, independently of each other. This was the first attempt at introducing fluids into all the nasal sinuses simultaneously. Lipiodol was first used and the X-rays conclusively demonstrated the opaque medium in the sinuses of the living subject as well as in a cadaver. The technique today is essentially the same, although a lot has been written since this event. The method has become quite popular, because it is simple to carry out and very effective in properly selected cases.

I am confining this paper to treatment only, and not to the diagnostic side. Whether the use of radio-opaque substances adds anything to a radiograph or not has been discussed far and wide. The consensus of opinion amongst radiologists is that they can get very little additional information through the use of radio-opaque substances by displacement. Also Glaser, Mark, Futch and Snure studied the literature for opinions on the reliability of simple X-ray studies, and found many reports of negative X-ray findings in sinuses which at operation were found to contain pus, and many more which were found to be not diseased in spite of increased density to the rays. I personally do not place much reliance on X-ray plates alone in sinusitis cases, and prefer to base my diagnosis mainly on clinical evidence.

Bacteria are always present in normal mucous membranes, but are kept in check by the normal body defences. As far as intrasinus treatment is concerned, it is notoriously difficult to get ordinary nasal douches or sprays to penetrate even normal sinus ostia; much less so in diseased conditions accompanied by oedema of the tissues causing constriction. Proetz reckons one of the chief factors in the prolongation of a sub-acute sinus infection into a chronic one, is the retention of infection and irritating exudates which lie for a long time at the bottom of the sinuses, and by their continued presence, bring about hypertrophies and hyperplasias. The important factor in displacement is the dilution of pus which facilitates its removal, and renders the fluid contained in the sinuses non-irritating. It promotes the essential drainage required to help and enable them to establish their normal function again.

The air in the sinuses can be replaced by suction applied to the nasal cavities, and is replaced by any fluid in contact with the ostium the moment the vacuum is released. Gravity cannot be used in this case, because the ostia are too small to permit the exchange of air and liquid without a certain amount of suction being applied, thereby permitting the penetration of fluids into cavities previously occupied by air.

PHYSIOLOGY

Each sinus communicates with a nasal cavity and therefore with the outer air through a relatively small opening. These openings in the erect posture occur in different positions; the frontal sinus, below, at the most dependable part; the ethmoid, open at the side; the sphenoids, low down in its anterior wall, and the antrum, near the roof. The ostia are normally patent and permit the free exchange of fluids and air. In unobstructed healthy noses, ciliary action effectively empties the sinuses, irrespective of posture. The normal sinus is lined with a low stratified columnar epithelium, completely covered with cilia. The extent and effectiveness of ciliary propulsion are greatly modified by excess of moisture which creates gravity currents flowing over the neutralising ciliary currents. So long as the foreign body is minute with the rays. I personally do not place much reliance on X-ray plates alone in sinusitis cases, and prefer to base my diagnosis mainly on clinical evidence.

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Absorption of toxins and the production of pain.

**Treatment.** In treatment the restoration of physiological function is the aim. Remove conditions hindering the absorption of toxins and the production of pain. This means removal of infection and establishment of ventilation and drainage, as infection readily ensues when these are impaired. Old hyperplastic membranes are inactive, and less likely to yield to treatment.

**THE DISPLACEMENT TECHNIQUE**

The displacement method is accomplished very easily by letting the patient (whose nasal membranes have been previously shrunk with a vasoconstrictor) lie on a table or couch, with a pillow under the shoulders, and the head lowered so that the chin and external auditory meatuses are in the same vertical plane. The patient is told to open his mouth and to keep on breathing, thereby overcoming his desire to hold his breath and to swallow. Several drops of a 1% ephedrine hydrochloride solution are instilled in each nasal chamber. Two to four c.c. of 4% to 1% ephedrine hydrochloride in normal physiological saline solution are now put into each nostril by means of a 10 c.c. syringe. The fluid should be at body temperature for comfort. Intermittent negative pressure should be applied, to one nostril. A finger closes the other while the patient repeats K-K-K. The intermittent negative pressure is obtained by opening and closing a hole drilled in the side of the tip for the purpose. The suction should be released as soon as a vacuum of 150-180 mm. is obtained, which occurs in a fraction of a second. About one second should elapse before it is re-applied, to permit ample time for the fluid to penetrate the ostium. The process is applied alternately to the nasal passages if both sides are involved. More fluid is instilled into each nostril, and the suction process repeated. A total of 10 to 15 c.c. of fluid is sufficient for most purposes, but more may be required in individual cases. Do not put more than 4 c.c. into one nostril at a time, as the fluid may enter the oropharynx and excite gagging.

The sphenoidal and posterior ethmoidal cells occupy the lowest portions of the nasal chamber. In this position with their ostia upturned, they are very suitable for filling, and receive the greatest proportion of fluid. The anterior ethmoidal cells are usually partially filled. The maxillary ostium is in the inverted position near the most dependant portion of the sinus, so that complete filling cannot take place. Enough fluid gains entrance, however, for therapeutic purposes. Difficulties are often encountered in the frontal sinus. Here the naso-frontal duct is narrow and bubbles of air are not easily displaced from it, and relatively small amounts of fluid gain access.

**Precautions.** The patient should experience no ill effects following the manipulation. Recurring headaches may be due to the irritating nature of the solution employed, or to excessive negative pressure used. It should never be sufficient to cause pain or epistaxis. Patients with very high blood pressure should not be done. Also avoid irrigation in the earliest stages of acute nasal disease, and when patient has a temperature, because of the possibility of disseminating any infection which otherwise might have remained localised. Proetz states that in his long and extensive experience of displacement of sinuses, he does not know of a single instance in which infection has been spread into sterile sinuses during treatment. He believes that by the time displacement was employed the patient's immunity had progressed so that bacterial growth did not occur in the presence of the solutions employed. He also believes that there is no possibility of contaminating the Eustachian tube and middle ear with secretions from the nose, as the lymphoid tissue from the pharyngeal end of the cartilaginous tube prevents air from escaping from the middle ear when suction is applied. As this is essential for the introduction of fluid, no penetration occurs. The filling depends entirely upon the removal of air.

**Type of Equipment Used.** The operation should have constant negative pressure which can be regulated to approximately 150-180 mm. of mercury. A suction gauge is usually attached to the automatic pump. A reading of 7 on the gauge, which is equivalent to 7 inches (17.7 cm.) of mercury, is the optimum of suction. The hole by which the pressure is interrupted should be fairly large to ensure prompt and complete fluctuations. Immediately continuous with the tip there should be a glass reservoir for overflow. The ordinary Sorensen goose-necked glass tube and suction tip is used by most operators. The automatic pump has the advantage over hand-pumps and rubber bulbs, of assuring a vacuum at the moment the patient manages to get his pharynx in the 'K' position. When the patient swallows or says K, K, the nasopharynx is closed off from the oropharynx, the nose thereby becoming a closed cavity. The solutions for the washouts must be carefully chosen. The simplest of these and the one usually employed is an isotonic or physiological salt solution. If antiseptics are used at all they must be carefully chosen for their non-irritating and non-toxic qualities. Dilute solutions of the common silver colloids are generally employed. Argyrol is used in concentrations of 4-10%. As a general rule, a mucous membrane which responds at all to palliative treatment recovers with the establishment of ventilation and drainage without the use of antiseptics.

The sulphonamides have given very indifferent results. When they were first tried in chronic maxillary sinusitis, the sudden cessation of purulent secretion seemed miraculous, until it was discovered that instead of being suppressed, these secretions were merely coagulated in a single large lump too bulky to make its way out of an ostium. Whalen tried the local use of sulphadiazine in the concentration of 2.5% in aerosol, and found it to be without effect in controlling the progress of nasal sinus disease, either of the acute or chronic type. He had some success by giving full doses of sulphonamides by mouth. Woodward found solutions of penicillin in concentrations of 250-500 units per c.c. to have no damaging effect on the cilia or the epithelium of the respiratory mucosa in clinical practice. Solutions of higher concentration tend to impede ciliary action in various degrees. He reported on a large series of carefully controlled observations and came to the conclusion that the effects of penicillin in the nose were very slight.
and the results of local therapy on the whole, very disappointing. Cocaine must be used sparingly, if at all, in displacement therapy, owing sometimes to undesirable cocaine reactions and toxic symptoms supervening in susceptible cases.

**DISPLACEMENT IN CHILDREN**

This type of treatment is very valuable in the persistently discharging noses of children which fail to respond to the usual drops and lotions. Sinusitis in children is generally seen between the fourth and tenth years. The ethmoid is well-developed at birth, the maxillary sinus is fully developed only at puberty, and the sphenoid and frontal sinuses, about the twelfth year. A discharge in the middle meatus in a child under six usually means involvement of the ethmoid or maxillary sinuses. Tenderness over the thin areas of the sinus walls is of great assistance in the diagnosis in older children. The recognition of a sinus infection in children is frequently overlooked.

Local treatment consisting of a small amount of suction carefully applied for a short interval of half to one minute is very effective. Long periods of negative pressure should not be applied as a secondary oedema may follow. Children usually co-operate very well and one has surprisingly little trouble with them if a little patience is exercised. The ethmoids and maxillary antra are of special clinical significance in small children; the frontal and sphenoid sinuses are not. Children who are too young to co-operate should be swathed in a sheet and laid in the usual position. With the head thus extended the pharynx closes naturally, especially if the child cries, and there is no real trouble in procuring a vacuum when the tip is applied.

Proetz recommends from 2 to 8 c.c. of 1% ephedrine by displacement every few days. The discharge quickly diminishes and soon ceases altogether. This is the rule if the condition is amenable to treatment by this method. Cases which fail to respond in any degree in this short time are unlikely to respond at all. Here, too, the establishment of ventilation and drainage with the least possible trauma is of the greatest importance.

**Allergic Changes in the Sinuses.** It is very difficult to fill the sinuses by displacement while the patient is under the influence of an allergic attack, owing to the extent and rapidity with which the sinus mucosa swells. The living membrane of the maxillary sinus can, under the influence of an allergic reaction, increase in thickness from a fraction of 1 mm. to 1 cm. or more overnight.

**CONCLUSIONS**

My own observations on 50 consecutive cases treated by displacement with ephedrine 1% and normal isotonic physiological saline solution, gave very gratifying results. These cases were sub-acute as well as chronic ones. From four to eight instillations at 3 to 7 days' interval, were given in each case. Treatment was stopped as soon as the washings were clear and the symptoms disappeared. Almost all cases were greatly relieved of their post nasal discharge, nasal obstruction, and headaches. In some of these cases additional treatment such as removal of polypi, submucous resection of bad septal deviations, and window resections of antra was instituted. One observed that even when the first displacement produced frank pus with a foul odour, the infection sometimes cleared up with irrigations alone. The best results were obtained in the sub-acute catarrhal type of sinusitis.

I do not think by any means that this displacement treatment is a 'cure all' for every case of sinusitis, but it is well worth while giving it at least a trial. The latest trend of sinus treatment is a strong leaning to the conservative side.

**THE PREMATURE INFANT**

**A NEW APPROACH IN ITS MANAGEMENT***


*Cape Town*

This paper is a personal study conducted on 20 premature infants admitted to the Premature Unit of St. Mary's Maternity Hospital under Professor Wilfred Gaisford of the Department of Child Health, University of Manchester, during the early months of 1948. The birth weights of the infants varied from 2 lb. 11 oz. to 5 lb. 5 oz. the majority being in the 3-4 lb. group.

The essential feature in the new approach to the management of the premature infant is the initial starvation programme of 72 hours which is a routine procedure in the Premature Unit at Manchester.

*This paper was read at the Medical Congress of the Association held at Cape Town in September 1949.*