Ozaena
Thesis for M.D.

by

Richard Vassie M.B. c.m.

21st April 1886.
21st April
1886

Sir,

I hereby certify that the accompanying thesis is my own composition; that I shall be twenty four years of age before August 1st, 1886; and that since obtaining the degree of MB:CM: in 1883, I have been engaged in the study or practice of Medicine.

Yours truly,

Richard Vassie MB:CM.

Prof. J. R. Fraser
Dean of the Faculty of Medicine
Before commencing the study of Fæcæna it might be interesting, for a moment, to consider the 
history of the disease.
The term fæcæna is one of the oldest in medicine, 
it was used by the Greek and Latin authors to signify 
not simply a stench, but more correctly a foul 
smelling ulcer in the interior of the nose.
Galen mentions two kinds of fæcæna—one an ulcer 
of the nasal mucous membrane different being 
the other, when the ulcer has a disagreeable 
odor.

Fabricius ab Aquapendente considered the 
disease as an ulceration of the interior of the 
nose, often connected with syphilis, but not necessarily 
so.

At the close of the 17th Century, Nævessæn taught 
that "fæcæna nasalis" was caused by the fermentative 
putrefaction, which the mucous secretion is apt 
to undergo, when retained too long within the 
nose, or adjoining sinuses; a few years later, 
Reiniger maintained, that the decomposition of 
mucous within the ethmoidal, sphenoidal, frontal 
sinuses, or the antrum of Highmore, produced 
almost incurable fæcæna.

During the last fifteen years our knowledge of 
the subject has been very much increased by 
the labours of Breuer, Kandlb & Fränkel, & the result 
of their work will be fully considered under 
the head of Pathological Anatomy.
Definitions

Many authors, including Schrötter & Strack, do not consider the term as applicable to one individual condition, but group under the head of Ozaena, all diseases of the nasal cavity which produce a foul discharge.

This classification has the obvious disadvantage, of including under the same name, processes which have little or nothing in common, e.g. carious & necrotic processes of the bone, and ulcerations of the mucous membrane, as well as the condition leading to atrophy of the turbinate bones.

The smell, too, of the discharge, is not the same in the different forms, and anyone who has had much experience in Ozaena, can distinguish between the bad smell produced by ulcers in the mucous membrane, or dead bone, and the characteristic, foul, & eurking stench associated with atrophic turbinate bones.

By most authorities now, including Gottstein and Mackenzie, the term Ozaena is limited to "dry-cataract", associated with atrophy of the turbinate bones. Mackenzie gives the following definition: - "Ozaena is a chronic inflammation of the lining membrane of the nose, in which a thin secretion, instead of flowing away, dries on the surface, giving rise to adherent brown or green flakes, or crusty masses of dried mucus, which are apt to undergo decomposition, & cause a disgusting
Characteristic stench, known under the name of 'maena.' There is often atrophy of the turbinate bones, and of the subjacent bony structure, whilst the nasal passages & meatuses are proportionally increased in capacity.

**Symptoms**

The symptoms, far excellence, is the characteristic, indescribable, but unmistakable stench from the nostrils, of which the patient may be quite unconscious as the sense of smell is often partially or entirely lost.

If the disease is limited to the anterior part of the nasal channel, no inconvenience beyond a slight itching, and desire to blow the nose, is experienced; but in more severe cases, the irritation is so great that the patient cannot refrain from picking & scratching the mucous membrane, causing ulcers, and MacKenzie has seen a case, in which perforation of the septum, was produced in this way.

On examination of an advanced case by anterior rhinoscopy, the cavity is found to be much larger than usual — as much so, that one can see the posterior pharyngeal wall, & in some cases, even the opening of the Eustachian tube.

On closer inspection, the increase in size is seen to be owing to atrophy of the turbinate bones — especially the lowest one; and in many places yellowish or greenish crusts are to be
seen, which sometimes are very firmly adherent to the subjacent mucous membrane, or leave ulcers after their removal.

But is atrophy always present? Most observers answer this question in the affirmative, but Gottstein & MacKenzie record cases in which with marked gastritis no atrophy could be made out; and I while working at Professor Schütte's clinic at Vienna, saw a case, which when examined by both anterior & posterior rhinoscopy, exhibited not only no signs of atrophy, but the hypertrophy was marked - the mucous membrane being red, swollen, & thick to pressure with the sound - yet the discharge was marked and persistent.

MacKenzie has explained the occurrence of gastritis with apparent general hypertrophy of the nasal mucous membrane, by supposing that there must be atrophy in a part inaccessible to examination, & this seems to me a feasible explanation.

Pathological Anatomy

Before going into the various theories in detail, I think it would be well to give shortly the chief views held by the principal authorities at the present day:

1. That the process consist in a hypertrophic inflammation of the nasal mucous membrane, leading afterward to cirrhosis, with atrophy of
mucosa & its various constituents, also of the underlying bone, and that the direct cause of the 
ulceration is twofold viz:—

(a) Alteration in the quantity & quality of
the secretion, owing to the change in the mucosa 
and its glands.

(b) 
owing to the increased capacity of the nasal 
cavity, the force of the current of air passing 
through it is diminished, so that the nasal secretion 
is more liable to stagnate, dry up, forming crusts, 
and decompose.

This is the view held by Gotztstein (Breslau) 
Fränkel (Berlin) & Suckerkondoll (Vienna)

2. That in all cases of atrophic ulcers, there is 
a congenital absence of a rudimentary condition of 
the turbinated bones; that the mechanical 
cause i.e. the enlargement of the nasal 
cavity, is sufficient to produce ulceration.

This is Gauflab's view.

3. The third, is that ulceration is due to the chronic 
inflammation of the sinuses near the nose, 
especially of the ethmoidal & epipharyngeal cells.

This is the old theory of Neussens, & it's present 
day advocate is Michel.

4. The last is the milder theory of Kroneberg.

Each of these will now be considered 
in detail.

Gotztstein in the "Berlin Klin. Wochenschrift" 1878 says 
that he considers ulcers a constant symptom.
of rhinitis chronic, which has reached the atrophic stage, and in which owing probably to a destruction of some of the mucus glands, there is a diminution in the quantity, & an alteration in the quality of the nasal secretion, causing it to dry rapidly, & instead of being removed by the natural means, it adheres to the mucous membrane in the form of crusts, which undergoing decomposition give rise to a foetid odour.

Zuckerkandl in his book "Aller die normale und pathologische Anatomie der Nasenhöhle" devotes a long article to the subject & I shall as shortly as possible give the most important parts of it.

He says: genuine atrophy of the turbinate bones is the result of disease of the mucous membrane, & does not always attack the three bones at the same time, but often only the inferior or middle one alone; but in most cases both right & left sides are affected.

At an early stage the bone becomes more flexible, thinner & smaller in bone as well as in mucous membrane. Later it becomes flatter, & the process gradually progresses, until at last in the highest degree of atrophy, one finds on that part of the outer nasal wall, where previously the inferior turbinate bone was, can now be seen
nothing but a fold of mucous membrane, containing a tiny saccule— all that is left of the bone. The mucous membrane is shrivelled & thrown into folds. The cavernous tissue is destroyed, and the white, thin, shining surface resembles a serous, rather than a mucous membrane.

In many cases, it appears as if the atrophy of the bone, is in excess of that of the mucous membrane, which hangs down over the edge of the bone, as a thin loose flap.

He studied the various stages of atrophy, in the incinerated turbinate bones of many subjects, & came to the following conclusions:

In the slightest degree of atrophy, the inferior turbinate bone is only thinned, brittle, & sometimes perforated in places.

Later, the height of the bone is diminished, the free border is no longer convex, but straight, or even concave.

Fissures form round the edge of the part thus affected, gradually as it were melting down. A similar bone forms, & again & again the same process takes place, till a mere ridge of mucous membrane is all that is left.

The atrophy of the turbinate bones alters markedly the shape of the nasal cavity, enlarging it as much indeed, that the posterior Ethmoidal wall, & sometimes the orifice of the Eustachian
tube, can be seen that the meatus.
When the middle turbinate bone is destroyed, the crescentic fold of the middle meatus is exposed to view, and in some cases it is possible to see the anterior surface of the septum with it for-

The sense of smell is generally affected, owing to the shortening of that part of the ethmoid bone, down which the nerve filaments pass.

What is the cause of this atrophy?

On this subject, Frankel, Saufal, & Michel have done good work. They are all agreed, that in some

The turbinate bones are abnormally small, but while Frankel & Michel consider this condition a part of the disease, Saufal believes it to be owing to a congenital absence or rudimentary state of these parts.

Before Saufal published his views, Hyrtl reported a case of what he called congenital defect of the turbinate bones, which he considered a great rarity.

In this case, all the turbinate bones were absent, & the place where the should have been, was only shown by bands of mucous membrane, which though elsewhere perfectly healthy was here dry & of a fibrous appearance.

He (Hyrtl) thought the possibility of this condition being the result of a pathological process, was excluded by the symmetry of the defect,
in both nasal cavities, the absence of any marked affection of the mucous membrane, nasal septum, or more externally, and of the perfect healthy condition of the bones.

Suckertande, on the other hand, says that the above condition does not prove a congenital absence of the turbinated bones, but is especially suggestive of a hypertrophic inflammation passing into the stage of atrophy, for this affection is generally symmetrical; the mucous membrane, septum, external nose are not markedly affected, & the other bones are also healthy.

He considers that the case reported by Heppe, was not one of congenital absence of the turbinated bones, but of extreme atrophy of these structures; & he considers his view to be confirmed by the fact, that there was no proof that the condition had existed since birth, as well as by the actual state of the nose at the time; for the mucous membrane covering the turbinated bones is reported as having a dry & fibrous appearance — the condition one finds in atrophy.

He says that Sambod's views about the congenital absence or rudimentary condition of the turbinated bones, was only founded on examination of living patients; & to have or disprove the truth of his theory, he examined the skulls of 252 children — 30 of them in the first month of life, & only in one did he find small turbinated bones, &
This was the case of a 12 year old boy, who was
known to have suffered during life from jaena.

He agrees with Frankel, who insists, that an
enlarged nasal cavity alone does not produce
jaena; but in addition there must be inflammation
of the serous membrane, leading to drying up
of the secretion into crust, which afterwards under-
go decomposition. Further that the inflammation
is at first hypertrophic, passing gradually into the
stage of atrophy, producing not only an enlarged
nasal cavity, but a cirrhotic condition of the
serous membrane, with destruction of glands,
leading to a chemical alteration in the character
of the secretion.

He considers that Michel's view viz., that a diseased
condition of the sinuses, must be considered as
the cause of jaena, is not confirmed by his-
(Suckermandl's) - post-mortem examination, for in
many cases, he found the neighboring sinuses
healthy. He says, a chronic inflammatory
condition of any of these, may accompany
jaena; but it is certain that the affection of
the nasal serous membrane, is its primary
cause, and as this may easily spread to any of
the sinuses communicating with the nose,
there is no doubt, but that one or all of them,
may be secondarily affected; he knows this
by mentioning one case of atrophic turbinate
bones, in which, the serous membrane of the
Anthem. If Highmore was inflamed, suffuring; a matter, with a collection of bad smelling mucus in the ethmoidal sinus. On the other hand, however, the neighbouring sinuses are often found normal.

He concluding his article on this subject, says that from his anatomical researches, he has come to the conclusion, that epistaxis is caused by a chronic hypertrophic catarrh of the nasal mucous membrane; in consequence of which the mucus and turbinated bones, are reduced to a state of atrophy, which alters abnormally the amount, or chemical composition of the secretion; and also that the state of the nasal cavity—enlarged by the atrophy of the turbinated bones, alters the resorptive condition within the cavity, as favours the stagnation of secretion, crust formation with subsequent subrefraction, and the production of a penetrating atelectaxis.

Krause (Berlin) at the meeting of the International Congress held at London, in 1881 (Transactions vol 3, page 311) in the discussion on this subject, communicated the result of the post mortem examination of two cases of "genuine atrophy of the turbinated bones" with epistaxis. He exhibited sections under the microscope, and asked the members to examine them, and compare his description with what they saw.

He said: "The patients during life, were observed by Professor Kretzner of Vienna, to neither sneeze, nor
at the root-nerves, were ulcers of the mucous membrane, or cavious or necroto processes of the bone, to be detected.

His description of the microscopical phenomena runs as follows:

"The epithelium frequently defective, sometimes entirely absent, in some places has undergone a horny change. The mucous membrane itself shows marked atrophy. Every where are seen dense tracts of connective tissue, which only become thinner and more delicate superficially, but which even there are present almost everywhere. As to the bloodvessels, there is a marked loss of them generally, and those remaining have undergone considerable changes. The adventitia is thickened, the intima tortuous. The lumen considerably narrowed. The glands are comparatively well preserved in a few places only; most of them show a more or less developed infiltration, others a granular or fatty degeneration, again large tracts of the mucosa are traversed without detecting a trace of them. The most remarkable thing in our specimen, however, is the presence of an enormous infiltration of round and spindle cells, the cells of which do not anywhere show a distinct contour; but have disintegrated into a fatty detritus, which is often still arranged in its former cell form; besides this infiltration, the presence in the mucous membrane of numerous large and small
fat globules, a fact which is very suggestive of an explanation of the origin of the factor." He goes on further to add: "We have to seek in this enormous fatty debris, in the numerous fat globules, the factor which produces the factor. He finds horny epithelium, which adheres to the a very suitable soil for the formation of crusts and scabs. He finds a considerable loss of bloodvessels in general, changes in the individual ones. He finds further, destruction of plasmatic elements, which has nearly led to their total abolition. Finally, we see the fatty detritus and fat globules. Serous membranes of this atypical character can only produce a very tenacious, quickly drying crust, which will form crusts and scabs with horny epithelium. The enormous quantity of fat, secreted into beneath the epithelium, will quickly undergo decomposition, to change into fatty acids in the crust, thus produce the peculiarly rancid smell, the occurrence of which cannot render the circumstances less strange. The correlation that this effect is due to the fat, we find further, in the result of the microscopic examination of the crusts in our two cases, which shows fatty degeneration of epithelium, accumulation of fat granules, fat globules, and numerous crystals of mucic acid.

He must now consider the form theory of laevia, for it, as in most other diseases now a-day, a month has been found, if it has been
ascended, the power of producing the disease.
At page 542 "L’Union Médicale," I find a paper
"Sur la nature et du traitement de l’ozème," read
by Dr. Docenzien of Paris, at the International Congress
of Bale; in this he ascribes the characteristic
features of ozema, to the presence of a special
minute.
He says, in examining the nasal secretion of
patients affected with ozema, he has always found
a minute, characteristic, & unmistakable.
It is a specially large corpus, or curving in hairs,
arranged in chains, once in groups.
In the specimens he examined, it was always
stationary, with the exception of a single case, in
which it exhibited an active & wavy motion.
These corpus are generally elongated, but in varying
degree, some approaching to the ovoidal, others
to the ellipsoidal shape. Sometimes their optical
section is almost rectangular, as if they were cylindrical
instead of being thinned or conical at the
two extremities.
On examination with a very high power, I contrast
the homogeneous immiscible, after staining with
fuchsin violet, he sometimes noticed toward the
center, a zone cleaner or paler than elsewhere, but he
was unable to decide whether this appearance
was caused by the formation of he thought
more likely of commencing fission.
He says this this corpus resembles others in form, yet
its great size at once distinguishes it from them, as its longitudinal diameter varies from 1.1 to 1.65 mm, and he has never seen any smaller.

Using Koch's method of culturing with heptonised gelatine, he succeeded in obtaining some cultures containing nothing but the large cocccii.

The day he has been trying to inoculate animals with his pure culture, in order to produce typhus in them; but does not mention that he has in any case been successful.

The object of the method of examination used by Räntkel, was instead of taking the secretion direct from the nose of the patient, used that contained in the plug of cotton wadding which had remained in the nose for some hours, and which was examined. This secretion showed four kinds of microbes viz.:
1. Small cocccii
2. Large cocccii - comparable to large
3. Elsden bacilli
4. Large rods.

If the four varieties, he can make the small cocccii & large rods.

While in Vienna last month, I watched with great interest, the experiments of Dr. Hotz conducted on this subject in Dr. Frisch's bacteriological laboratory.

In the nasal secretion of all typhus patients, he found without difficulty Loewenbert's coccei, but there was no ratio between the number present, & the severity of the disease.
After obtaining a pure cultivation, he inoculated it into the nasal mucous membrane of two rabbits, but without the desired result; this he did repeatedly with the coeci obtained from various patients, but without success.

He then examined some mucous taken from the nose of a healthy man, and to his surprise found coecens and coeci present in considerable numbers; this result he confirmed by subsequent experiments.

My views as to the pathology may be shortly summed up before leaving the subject. I consider that Stafleu's theory - congenital absence or rudimentary condition of the turbinated bones, has been entirely destroyed, & the numerous post mortem examinations of jerseys.

2 That Demereyer has failed to make out a case for the coeci - in fact that their claim to be considered as a cause has been destroyed.

3 That the true cause is a chronic hypertrophic inflammation of the nasal mucous membrane, especially the part covering the inferior & middle turbinated bones, passing gradually into atrophy, with the formation of fibrous tissue (carbuncle) leading to a destruction of many of the blood vessels, & glands, thus causing a fatty degeneration of the epithelial element of the mucosa, & a chemical alteration in the character of the secretion, rendering it more liable to dry up, forming crusts, & under deconcretion, giving rise to the characteristic
smell. That with this must be associated a mechanical factor, in that owing to the enlargement of the nasal cavity the current of air is less forcible as it passes thus the naso, and therefore more favourable to the retention of secretion.

4. That while chronic inflammation of the neighbouring cells — ethmoidal, osteomudal, etc — Antrum of Highmore, may accompany lyeena, it can in riviue be considered to have a causal relation.

Etiology

Most authorities are agreed, that the predisposition to this condition, is to be considered as attributable to a hyperplasia — struma in syphilis; and the percentage of cases assigned to each, is estimated by the various authors, very variously, so the explanation of this is found in the fact, that while some in their statistics consider lyeena in its broadest sense, — including carious & necrotic processes of the bone, as well as affections of the mucous membrane, others use the term only in its limited meaning— atrophic liminated bone with a foul discharge.

As regards syphilis, Mackenzie, who in his statistics, uses lyeena in its limited sense, has only met with three cases in which there was any evidence of hereditary syphilis, or also three, in which lyeena with nose ulceration, followed acquired syphilis. But as he points out, the disease often arises in persons otherwise apparently healthy, as it is obvious, that it may also occur in those who have had syphilis,
He therefore thinks that the presence of the latter, should be considered as an accidental accompaniment, rather than as a causal factor.

Struma, I would consider, as the mediastinal condition. We know that strumous patients are more liable to be attacked with inflammation of the various parts of the body, and that when this inflammatory condition has persisted for some time, instead of passing off, the tissue returning to its normal, as they would do in a perfect healthy subject, there is always a tendency for the condition to continue, to pass into the chronic state.

In nearly all the cases I have seen too, whether one or more of the features, we are accustomed to regard as characteristic of struma.

Diagnosis

The diagnosis of a marked case, offers no difficulty. For with the foul smelling discharge, we have the atrophic tuberculous bones.

Diagnosis

When the jaera is established, as we cannot do nothing against the atrophic condition, it is evident that we cannot affect a complete cure; but with care and attention, a palliative treatment gives very good results.

Contagiousness

Most authorities are agreed that jaera is not contagious. Deemingburg in his address at Sible, previously referred to, affirms it is so; and if we accept
his cocoebus theory, I think, we must agree with him in this point also.

But is this confirmed by experience? I think not; for how often does one see one member of a family affected with the disease, which runs its course for years, without the other members of the family becoming infected.

Treatment

I would divide the treatment into constitutional and local. As ozaena is here considered as a local manifestation of a constitutional disease, a weakness at least, it will be evident how important is the use of every means, whereby the general health is raised, to the condition of the blood improved.

In this way, we may hope when the condition is recognised at its very commencement, to retard further progress.

Lots of fresh air, regular outdoor exercise, in the country—in a mountain district if possible—must I think be considered of the first importance; for not only is the general health in this way greatly improved, but owing to the increased depth and frequency of the respiratory act, caused by the active exercise, the strength of the current passing through the nasal passages, is increased, so the tendency to secretion stagnation thereby diminished; and the pure mountain air, must at the same time, act as a deodoriser of the foul secretion, & a health-stimulant to the
diseased mucous membrane.
Anaemia is generally present with its manifold
results—weak circulation, impaired nutrition and
circulation of blood, which must be remedied.
In the treatment, I have most confidence in Arsenic
and Iron, alone, or combined with Cod liver Oil.
Local treatment the indications are threefold viz—

1. **Removal of Crusts**
2. **Prevention of foul smell**
3. **Promotion of so far as possible health & action
   in the mucous membrane**

**Removal of Crusts** In effecting this, either Webster's
douche, or what I believe to be better Schrött's syringes
may be used. The latter, having a glass barrel, the
fittings are made of vulcanite. The nozzle is
fixed on by a screw, so that according as the
stream is to be applied chiefly anterior or posterior,
a nozzle of different shape may be used.
The one for use anteriorly, is about an inch long,
bulb shaped, a smaller than the capacity of any
nose, so that water can always escape from it.
The one for posterior use, is about
three inches long, curved as represented, so that with
it, the fluid can be directly applied to the posterior
side of the nasal fossa, where hardened crusts
sometimes form, which can hardly be removed
by other means.

It has been shown by Professor Schrött, who
experimented on himself, that the sensations
produced by the passage of a slightly alkaline fluid, e.g. a 10% solution of Carbonate of Soda over the nasal mucous membrane is less disagreeable than when plain water is used.

When the fluid is injected into the nose, owing to the reflex passage backwards of the soft palate against the posterior pharyngeal wall, the region of the posterior naso, is shut off from the pharynx below, & the greater part of the water returns by the other nostril.

If too much water is used, or its outflow prevented, in the syrninge, made with too much force, the fluid is very apt to be eided of the patient swallow during the injection, it pass through the Eustachian tube, into the middle ear; & a considerable number of cases are reported, in which a supination of the middle ear has in this way been set up.

This unpleasant result can however easily be avoided, if care be used, attention being to the following points:-

The patient’s head must be slightly bent forwards, so that the plane of the floor of the inferior meatus, has a slight downward inclination.

Breathing must be performed through the mouth which must be held well open.

If the two nostrils are unequally affected, then the nozzle of the syringe must be placed in the least affected one, for most of the fluid passes away by the other nostril, so the syringe the
placed in the most atrophied one, then the outflow from the other side will not be so free.

Further the injection must be slowly and gently performed, giving up the regular observance of these precautions, cases of ranula inflammation setting up the injection, were in Dr. Schüttes clinic, almost unknown. Weber's douche, which some authorities praise so highly, was there seldom used, for the following reasons:

that while it does very well where the crusts are soft, or not firmly adherent, or only the foul secretion requires to be washed away, yet when there are one or two hard crusts firmly adhering, to say the middle turbinate bone, then in order to obtain sufficient force to detach them, it is necessary to raise the can, a height which is not always convenient; or than a continuous stream of considerable force, as applied, the risk of fluid entering the Eustachian tubes, is increased; while if the syringe is used, the stream can be more easily directed, to the face of the injection being entirely dependent on the pressure on the piston, can be more easily regulated, than is possible with the regular flow of the douche.

It is only necessary at first, that the surgeon should perform the syringing; for the patient, friends, if they are at all intelligent, can easily be taught.

Prevention of foul smell

This is best accomplished by syringing out the
motive once or twice daily according to the severity of the case with some antiseptic lotion or boric acid is the least disagreeable. The pain at the nose is quite strong enough.

Gelatin rods, medicated with Iodoform, are often very useful. The strength to begin with should not be greater than one centigram. Iodoform, to each rod, the strength can afterwards be increased if necessary. Each takes about half an hour to melt. It is important before the first one is inserted, to ascertain & maintain rhinostomy if possible, the exact size & condition for if it is too long, the projecting end has an irritating effect, causing coughing, or the rod may be expelled. The characteristic & some people unpleasant smell of Iodoform, is an objection to its use in food practice; but the odour may be masked by mixing with it finely powdered coffee, or cinnamon, the salicylic principle of the Tonka bean.

Promotion of more healthy action in the mucous membrane. Gottstein has been very successful in his treatment of this condition, by tampons of wadding introduced into the cavity of the nose.

As it is owing to the decomposition of the crust, that the foul smell arises, he thought that by introducing into the nasal cavity an absorbent substance, which, in contact with the mucous membrane, would act as a slight irritant, causing an increased flow of mucus, the crust...
formation, & consequent factor, would be prevented; &
this treatment has proved remarkably successful.
Its chief is that the wadding should be introduced by
means of a stone 14 mm long, with its shank fixed
on to a handle. The wadding is to be fixed to the stone
inserted into the desired position in the
nasal cavity. Then, when the handle is rotated
in the opposite direction, the tampon remains
in situ, & the stone can be withdrawn.
If improvement does not take place at first,
it is owing to the hole being too small.
MacKenzie advises, that it should be retained for
a couple of hours every morning in one nostril, &
for the same time, in the other one, in the afternoon.
A marked improvement is often obtained, by the
application in combination with the wadding
Tampon, of stimulating remedies to the mucus
membrane; & a solution of Iodine in Iodide of
Potassium & Greenine, in the proportion of
Iodine 8:10; Iodide of Potassium 8:100; Greenine 3.
I have seen the best results.
Greenine here plays a double part, for as it does
not evaporate quickly, it retains the stimulant
long in contact with the mucus membrane.
While owing to its well known affinity for water,
it also keeps the mucus membrane moist,
& as checks the tendency to crust formation.
The treatment then I consider best is as follows:-
1. By spraying out the nostrils with a tepid 1/2 solution of Carbonate of Soda, this must be repeated, before each application of the stimulant.

2. With an ordinary laryngeal brush, the iodide of Jeeane (as we may call it) is to be applied slowly to the mucus membrane, passing first along the inferior meatus, then right back, then along the middle one, and after both drawn, insert a tampon of cotton wool. This must be repeated every second day, but cases will require treatment daily, but gradually it will be found that improvement results, so that the interval between the days of treatment can be lengthened.

3. Once or twice daily, the nose must be sprayed out at home, with a weak solution of boric acid.

**Operative Treatment**

In some cases, in which in spite of all care and attention to treatment, any slight of any improvement takes place, these are the cases I consider, in which operative treatment is indicated.

Volkmar in "Zeitschrift für Chirurgie" 1881 report two cases of Jeeane, which he had treated by removal of the lowest part of the middle turbinate bones, thus permitting a free current of air to pass through the nose ("Cursus Ventilation der Nase") so that afterwards the attack disappeared, under the use of the same stimulants and antiseptics, which for months previously had proved unavailing. He attributed the improvement
to the increased size of the nasal cavity, allowing a free current of air to pass through it; but is it not more probable, that the real explanation is, that in removing the inferior & a large part of the middle turbinate bones, he took away at the same time, the diseased muco membrane, secreting the easily hypertrophied mucus?

In the same way, I think, must be explained the benefit derived from Frentzel's treatment, by the application of white heat to the muco membrane.

When we have decided to operate, we have to choose between removing the bones, the actual & the salvarsan cautery.

I do not think the bones should ever be removed, in cases of simple gana; but only when dead bone is present.

The cautery, actual or salvarsan, should be applied to the muco membrane covering the turbinate bones; in this way, the mucoceous membrane with its diseased glands, is destroyed, & cicatricial tissue takes its place.

The salvarsan, can be applied with greater success than the actual cautery, & is therefore & be preferred.