

ZINC IONISATION AND ZINC ELECTROLYSIS IN DISEASES OF THE THROAT, NOSE AND EAR.

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BY electrolysis in medical work we usually mean the changes which take place when a needle attached to one of the terminals of an electric battery is inserted in the tissues ; and by ionisation, the introduction into the tissues of one or other of the radicles of a salt dissolved in water.

Zinc ions, whether derived from a zinc needle or from a solution of zinc salt, coagulate albumen. Consequently cells—tissue cells, blood cells, or bacteria—when penetrated by the zinc ions are coagulated, and therefore killed. Owing to the force in the electric current the zinc ions can be made to penetrate exudation covering a mucous surface, or granulation tissue, and for that matter the tissues themselves to any required depth.

Among the diseases in which zinc ionisation is of special benefit are chronic otorrhœa, and chronic empyema of the maxillary sinus, frontal sinus, or sphenoidal sinus. The destruction of aural polypi or granulations by zinc electrolysis is an illustration of the use of this procedure. If a microscopic examination is made of the discharge from a case of acute suppurative otitis media, and compared with one made from a case of chronic suppurative otitis media, it will be seen that in the acute case the leucocytes are well stained, and micro-organisms of one variety only are present, whereas, in the chronic case many of the leucocytes are badly stained and broken up, and micro-organisms of several varieties are present in large numbers.

When a patient gets an attack of acute otitis media the tissues are attacked by one variety of micro-organism ; the tissues react and in a few days develop sufficient immunity to repel the bacteria. Then one of two things happens : either the bacteria are killed and the discharge ceases, or, before this occurs the discharge is invaded by micro-organisms from the skin of the meatus, etc., and these micro-organisms and their products, and the decomposition products of the serum and leucocytes irritate the tissues with which they are in contact, and these latter respond by secreting more leucocytes and more serum.

This extra infection of the discharge is the basic factor in chronic otorrhœa, although other factors may be super-added later, by extension of the disease to adjacent parts, or by the development of polypi and caries. In stating this one is only applying Sir Almroth Wright's work on wounds to a special case of sepsis.

In chronic otorrhœa there is an infection of an albuminous fluid, outside the tissues but in contact with them, and the wall of the cavity in which the fluid lies is of living tissue.

In the acute case the attack is directly on the tissues : in the chronic case the attack is on the discharge, and there is, to borrow an analogy from "by-products" in chemistry, what may be called a "by-irritation" of the tissues.

By means of syringing and "free drainage" we can remove microscopic accumulations of discharge and avoid their reaccumulation, but we cannot deal effectively with the microscopic layer of serum and bacteria adhering to the surface. Experience shows that antiseptic drops and lotions frequently do not give rapid results. It is here that zinc ionisation is so effective. The criteria that might be suggested as tests of this statement are :—

1. The results should be immediate.
2. The results should be unequivocal, *i.e.*, in this case complete cessation of discharge.
3. The results should be consistent.

Before citing cases it is well to be precise as to the conditions which must be fulfilled in order that these results may be attained. Years ago Prof. Leduc laid down that zinc ionisation was an effective antiseptic procedure if the fluid containing the zinc salt was applied to the *whole* of the infected area, and the electric current was distributed in sufficient amount. If a mechanical obstacle exists, such as when the perforation in the drum is so minute that we cannot fill the middle ear with the zinc solution, or the septic material is in a place that is inaccessible without operation, such as the mastoid antrum, we need not attempt to apply this form of treatment.

The conditions existing in chronic otorrhœa may be tabulated thus :—

1. Tympanic conditions.
 - (a) *Tympanic sepsis*.
 - (b) Tympanic sepsis and granulations.
 - (c) Tympanic sepsis and polypi.
 - (d) Tympanic sepsis and caries.
2. Tympanic conditions + eustachian infection, septic tonsils or septic adenoids, rhinitis, septic teeth, sinusitis.
3. Tympanic conditions + inflammation of the external auditory meatus.
4. Tympanic conditions + mastoid or attic disease.

Cases of tubercular disease are excluded from the present discussion as in that disease the bacteria are situated in the tissues.

In cases in which the otorrhœa is due only to tympanic sepsis the result of treatment by zinc ionisation are immediate, complete and consistent. Some cases are quoted as examples.

Age of Patient	Ear	Patient states duration of discharge	Diagnosed cause of chronicity	Treatment
21	L.	8 years	Tympanic Sepsis	May 13. Zn. Ion. 3 ma. 15 min. May 17. No discharge
17	R.	11 days	do.	May 20. Zn. Ion. 3 ma. 10 min. May 27. No discharge.
29	R.	? years	do.	May 4. Zn. Ion. 3 ma. 10 min. May 18. No discharge.
7	R.	10 days	do.	April 5. Zn. Ion. 3 ma. 10 min. April 12. No discharge.
31	R.	2 months	do.	June 24. Zn. Ion. 3 ma. 10 min. July 1. No discharge.
29	L.	3 weeks	do.	October 18. Zn. Ion. 2 ma. 15 min. October 28. No discharge.

It will be asked : " Is anything in addition to zinc ionisation necessary or desirable ? " The answer is : " In cases in which tympanic sepsis alone is present, nothing whatever." Where small granulations exist, or where the mucous membrane is much swollen, or when the patient does hard manual work which would favour slight exudation, it is advisable to blow into the meatus after ionisation (but without drying the ear) some boracic powder to absorb and keep sterile any

serous exudation which might take place during the next two or three days.

When the patient returns in a week the discharge may have entirely ceased or only a very small quantity be present. If there is some it is removed with a swab and boracic powder is blown in. When he returns the following week the ear will probably be dry and require no treatment.

When the granulations are large and polypoid it is advisable before ionisation to insert into them two zinc needles and destroy them by electrolysis. Where a large polypus is present as much as possible should be removed by a snare, and what is left destroyed by zinc electrolysis. A polypus of a moderate size can readily be destroyed by this method alone.

Where much enlarged tonsils and adenoids are present these should be treated to guard against relapse, but in my experience they do not prevent the cure of otorrhœa by ionisation.

It is different where there is nasal and post-nasal infection with large numbers of bacteria in the nasal secretion. Ionisation of the ear in such a case is not likely to be a success unless this factor is first dealt with.

Cases of mastoid and attic disease are not usually suitable for treatment by ionisation alone.

Where the external auditory canal is inflamed and excoriated as a result of middle ear discharge it is advisable to blow in boracic powder after ionisation.

It is not always possible when an ear is presented for examination to say at the first visit what are the conditions present, but it is very much easier to do so after one ionisation. There is then, in those cases in which the discharge has not ceased, a great improvement in the ear, and it may be, for example, easy to discover a polypus which owing to the general swelling was indistinguishable from the rest of the cavity; or it may be possible to aspirate pus from the aditus, or some recess, where, owing to the swelling of the mucous membrane obstruction to its exit occurred when additional congestion was caused by the aspiration. During several years past the aid which ionisation affords in diagnosis has been frequently impressed upon me.

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At a recent meeting of the Otological Section of the Royal Society of Medicine I submitted the results of all cases treated by ionisation over a period of some months, and showed in those which were successful the total amount of treatment which each patient had received, and in those which were not successful the ascertained reason for the continuance of the discharge, *e.g.*, mastoid disease, polypus, cholesteatoma, etc. A synopsis follows. These cases were treated in the Aural Department of the Royal Free Hospital, where Mr. Gay French gave me ample facilities, at a Clinic for Pensioners under Sir James Dundas Grant, and at a Clinic for School Children in Stepney.

Number of ears ionised	217	
1. Number in which the result is known ...	157	
A. Discharge ceased	111	
(a) Due to ionisation	104	
(b) Possibly not mainly due ...	7	
B. Discharge not ceased	46	
Owing to :—		
(a) Conditions resulting from former mastoid operation	6	
(b) Polypi or granulation	13	
(c) Cholesteatoma or Epidermal over- growth	2	
(d) Mastoid or Attic disease	15	
(e) Eustachian obstruction	2	
(f) Tonsils and adenoids	2	
(g) Too small a perforation	1	
(h) Unascertained causes	4	
2. Number in which the result is not known		60
A. Did not return		24
B. Treatment not completed or observation not sufficiently prolonged		36

What proportion of cases of otorrhœa may be expected to be readily curable by ionisation ?

At a Clinic of the London County Council for the Treatment of Otorrhœa in School Children by Ionisation all the cases of otorrhœa attending a minor ailment treatment centre were examined, and the results are shown in the following table.

ANALYSIS OF OTORRHOEA CASES AT THE ALMERIC PAGET
MINOR AILMENT TREATMENT CENTRE.

IONISED Cases 38	Cured	Did not Return	Ceased to Attend	Referred for Operation	Still under Treatment
Cause of Chronicity of discharge ...					
1. Tympanic Conditions					
1. Tympanic Sepsis	16	1	1	—	—
2. Tympanic Sepsis + Granulations ...	5	2	2	—	—
3. Tympanic Sepsis + Polypi ...	1	—	—	—	—
2. Tympanic Conditions + Eustachian Infection, Tonsils, Adenoidis, or Rhinitis ...	3	—	1	—	—
3. Tympanic Conditions + Inflammation of the External Auditory Meatus ...	—	—	—	—	—
4. Tympanic Conditions + Mastoid Infection	1	—	—	2	1
5. Cause not diagnosed	1	—	1	—	—
TOTAL, 38 ...	27	3	5	2	1
NON-IONISED Cases 34					
Treated at Clinic by syringing and drops alone, 21 ...	21	—	—	—	—
„ + Referred for operation 8 ...	—	—	—	8	—
„ + Removal of Polypi, 2 ...	1	—	—	—	1
„ + Other treatment, 3 ...	—	—	—	—	3
TOTAL, 34 ...	22	—	—	8	4
TOTAL 72 ...	49	3	5	10	5

To answer the question with accuracy a much larger number of cases would have to be examined and treated, but from personal experience I can say the proportion is large. Twenty-one of the children who had been treated at the General Clinic by syringing and drops alone were well when examined by me. It may be concluded that these would have speedily recovered with ionisation.

An analysis of 49 cases cured by ionisation shows that

43 had 1 ionisation.
 1 had 2 ionisations.
 4 had 3 ionisations.
 3 had 4 ionisations.

Of these cases

27 paid 2 visits to the clinic.
 11 paid 3 visits.
 11 paid over 3 visits.

Of 18 cases which had been cured by syringing and drops it was calculated that the average number of visits was 50.

10 patients had under 20 visits.
 8 patients had over 20 visits.

The average number of visits of those cured by ionisation was 3.5.

Another question will be asked: "Is the result permanent?" Zinc ionisation is an antiseptic procedure. It is not a method for producing immunity. Immunity in these cases is a condition acquired as a result of infection or inoculation, and presumably the tissues in the ear have been inoculated to a considerable extent by the products of the germs which have been so long in contact with them. As a matter of experience, when a patient has recovered from the otorrhœa by ionisation a recurrence is uncommon unless the patient gets a fresh infection by bathing or by a severe cold or influenza. In acute otitis media which does not clear up rapidly treatment by a vaccine is rational and sometimes it obviates the necessity for a mastoid operation. To treat a case of chronic otorrhœa by vaccines alone is to court disappointment.

With the limitations previously described, and it is as necessary to bring into prominence the limitations as it is to state the indications, the treatment of otorrhœa by zinc ionisation is consistently successful.

Mutatis mutandis similar treatment is applicable to simple chronic empyema of the maxillary, frontal, or sphenoidal sinus. Special care is necessary in diagnosis to exclude ethmoidal disease. If ethmoidal disease co-exists and does not receive operative treatment prior to ionisation, re-infection of the larger sinuses is certain to occur.

The technique in the case of the nasal sinuses is complicated by the necessity for preventing the zinc solution running into the throat. A small air balloon introduced empty into the posterior choana or postnasal space and then inflated closes this opening, and then one can proceed to fill the sinus.

One of the great advantages of treatment by ionisation is that it is not necessary to alter radically the architecture of an organ to provide free drainage. The necessity for doing so was based on our inability hitherto to sterilise the microscopic layer of exudation and bacteria adhering to the surface of the mucous membrane without at the same time irritating the tissues. The knowledge of the efficacy of zinc ionisation in local septic conditions and the laws governing its application we owe to Prof. Leduc of Nantes, and it is the immediate unequivocal, and consistent results which follow the application of the knowledge and of the laws which convince us of its worth as a method of treatment.

*We sympathise with our readers in the delay
that has taken place in publication of this issue.*

*The Journal was in the process of printing
when Messrs. Cahill's Works were destroyed
by fire. Future issues will be published as usual.*