CLINICAL REMARKS

ON

THE TREATMENT OF CANCER OF THE TONGUE:

WITH A REPORT BY DR. M'KENDRICK ON THE CONDITION OF SPEECH AND TASTE AFTER REMOVAL OF THE ENTIRE ORGAN.

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FOUR patients suffering from cancer of the tongue have been treated in the wards during the last two months; and these cases, gentlemen, have afforded you an excellent opportunity of studying the symptoms and progress of this serious disease. I propose now to make a few observations in regard to the treatment of this affection.

The treatment of cancer of the tongue may be divided into two classes—1, palliative; 2, operative; and we are guided in our selection of these by the condition of the disease and general state of the health, and by the wishes of the patient. If the apparent disease admit of being entirely removed, if the patient's health will permit an operation, and if he or she be willing to submit to operative measures, I have no hesitation in decidedly advocating the latter treatment; but, if it be employed, it must be employed thoroughly. No half measures, such as nibbling away small portions of the organ, can benefit the patient. Except in a few cases, in which the disease is confined to the tip of the tongue, two operations only are advisable, in my opinion. The first is excision of one-half of the tongue, when the disease is limited to one side; the second is excision of the entire tongue, when the disease affects both sides of the body of the organ.

There can never be complete certainty that the cancer will not return sooner or later after an operation; but experience of the disease in this and other situations has surely proved that an early, complete, and successful removal of the affected parts gives the best chance of prolonging life and relieving suffering in the majority of cases.

In cases not suitable for operation, local and general sedatives, the division of one or both gustatory nerves when the pain is severe, and supporting the patient by nutrient fluids injected through an œsophageal tube or catheter, constitute the principles of the first or palliative treatment.

Let us now consider the best method of operating for the removal of a half of or the whole tongue. When the disease is confined to the tip, it is best removed by drawing the tongue well out, and applying the *écraseur* or galvano-cautery behind the disease, so as to take it and a good margin of healthy texture away; but, when the half or whole tongue is to be excised, a more complete exposure of the organ is required. Various external incisions have been suggested and practised in removal of the tongue. Incisions under the jaw, along the lower margin of the jaw, and through the cheeks, have all been practised; but the best method, undoubtedly, for thoroughly bringing into view the tongue in this operation, is that used by the late Mr. Syme. This plan consists in making an incision through the centre of the lower lip, chin, and upper part of the neck, as far as the hyoid bone, dividing the lower jaw through the symphysis, and drawing asunder the two halves of this bone, so as thoroughly to expose the tongue and its various connections to surrounding parts. Thus far I advocate Mr. Syme's proceeding; but, having well observed in his practice, in the practice of others, and in my own, the fatality of the operation when the tongue itself was severed with the knife, I no longer practise or advise the separation of the tongue by this method. Having had several opportunities of examining the causes of death after this operation when performed with the knife, I always found an unhealthy condition of the wound at the root of the tongue, with inflammation and suppuration of the veins connected with it, and also of the large veins of the neck, and too evident signs of pyæmia or blood-poisoning in other tissues and organs of the body. I was aware also that the separation of the tongue or portions of it by means of the *écraseur* or galvano-cautery had proved more successful in the hands of other surgeons.

In consequence of these facts, I have for the last four years entirely given up the use of the knife in these operations, except to expose the organ after Mr. Syme's plan; and have performed the separation of the tongue by means of the *écraseur*, in the way you have witnessed in several cases lately. Should the disease be confined to a half of the

organ, I split it along the middle line, as practised by Dr. G. Buchanan of Glasgow; and then apply the *écraseur* round the base of the diseased half, and so separate it. When the whole organ requires to be removed, I practise the same proceeding, first splitting the tongue as before, and then removing with the *écraseur* each half separately. By performing the operation in this way, I believe that the diseased organ can be more accurately taken away, so as to ensure the entire removal of the disease; and that there is much less risk of dangerous absorption from the wound, owing to the drawing together of its surface, and consequent closure of the mouths of the divided veins by the action of the *écraseur*. It is generally necessary to cut across one or both anterior pillars of the fauces, so as to apply the chain of the *écraseur* as far back as possible. After the operation, the halves of the jaw are securely wired together: a proceeding which allows the patient to use his jaws to a certain extent in masticating, and tends much to his comfort in every way. Should the patient be feeble, or unable to swallow readily, a tube or elastic catheter must be passed two or three times a day; and nourishing fluids, of which one of the best is milk, injected by it into the stomach.

As you know, I have lately employed this method of operating in several cases of removal of half of the tongue with good success; and in one case the entire organ has been in this way successfully taken away, the patient making an excellent recovery. The following brief note of this patient's case will, I am sure, interest you, more especially as it includes a report kindly made for me by Dr. McKendrick in regard to the condition of the speech and taste since the removal of the entire organ.

D. N., aged 35, was admitted under my care on the 23rd of October last, suffering from well marked epithelial cancer of the tongue, which had commenced about nine months before. On admission, the disease was found to involve almost the entire right half of the tongue; and it had also passed beyond the middle line, and affected rather more than the anterior half of the left half. There was no detectable glandular enlargement, and the patient's general health was fair. He was suffering from constant pain in the organ and in the side of the face and head, and was willing to undergo any treatment which would give him relief. On November 2nd, the patient was put fully under the influence of chloroform, and an incision made through the centre of the lip and chin, so as to expose the symphysis of the lower jaw and floor of the mouth. The bone was then sawn through, its two halves separated, and the lateral muscular and mucous attachments of the tongue carefully divided beyond the disease. The tongue was now split from root to tip, keeping accurately in the middle line; and, the anterior pillars of the fauces having been divided, each half of the organ was separately removed by applying the *écraseur* round its base. When the tongue was removed, the lingual vessels were noticed to ooze a little, and they were therefore both seized and tied. The solution of chloride of zinc having been applied to the whole divided surfaces, the jaw was drilled, and its sawn ends wired together. The patient's progress after the operation was everything that could be desired. For the first twelve days, he was fed three times a day with the tube; but after this he swallowed perfectly, and the tube was discontinued. On December 22nd, the wire was removed from the jaw, and the bone was found to be united in part, and sufficiently strong to allow the mastication of soft substances. The internal and external wounds were soundly healed, except one little external point on the chin, from which the wire had protruded. On January 6th, the jaw was firmly united, and the patient perfectly well in every respect.

REPORT BY JOHN G. M'KENDRICK, M.D.

I examined the mouth of D. N. with reference to (1) tactile sensibility, (2), sense of taste, (3), sense of flavours, and (4) vocalisation.

1. *Tactile Sensibility*.—This was determined by means of a small pair of compasses having sharp ivory points, the distance between which may be regulated to half a millimètre by means of a fine screw working transversely through the two limbs. Tactile sensibility was normal on the lips, cheeks, gums, and on the roof and floor of the mouth. Over the cicatrix indicating the position of the root of the tongue, tactile sensibility was increased. This was most marked a little to each side of the middle of the cicatrix. In this situation, the patient gave an involuntary start when the compasses were applied without his knowledge; but, when he was warned that the part was to be touched, he could bear the contact, and he could distinguish two points separated by a distance of $1\frac{1}{2}$ millimètres (0.06 inch).

2. *Sense of Taste*.—This was tested by placing on the cicatrix and in its neighbourhood small quantities of various substances, and noting the time between the moment of contact and the moment of experiencing the sensation of taste. The substances were applied by means of tubes about 2 millimètres (0.08 inch) in calibre, so as to obtain

localised points of contact. It was found easy to blow out of the tube a small quantity, say of powdered salt or sugar, on any spot previously fixed on. The following varieties of taste were examined: (1) sweet, (2) bitter, (3) saline, (4) alkaline, (5) acid, (6) astringent, and (7) fiery. This classification is that adopted by Bain and other psychologists, and appears to include all known tastes. Each substance was tested three times, and between each application the mouth was rinsed out with water. The patient did not see the substances employed. The following table shows at a glance the general result.

Variety of taste.	Substance.	Effect.
Sweet	Sugar.	Perceived almost instantly.
	Honey.	Perceived in about thirty seconds.
	Hyposulphite of silver.	Perceived instantly.
Bitter	Powdered colocynth.	Bitter taste, perceived in one minute and a-half: called it a bitter and sharp taste.
	Quinine sulphate.	Perceived almost instantly.
	Strychnine.	Perceived in ten seconds; persistent.
Saline	Chloride of sodium.	Very doubtful as to the taste. First called it sweet; then sharp.
	Sulphate of magnesia.	Spoke of it as bitter, and not like the last.
	Sulphate of soda.	Called it bitter and sharp.
Alkaline	Liquor potassæ.	Instantly perceived; called it sharp.
	Bicarbonate of potash.	Very doubtful about this; called it sweet, sour, and at last bitter.
Acid	Weak acetic acid.	Quickly perceived as sharp and painful.
	Weak nitro-hydrochloric acid.	Quickly perceived as sharp and painful. Did not think either of these was sour.
Astringent.	Alum.	Said it was sweet and "dry".
	Tannin.	No taste; called it "dry".
Fiery	Brandy.	Caused a burning sensation, like that produced by acids.
	Mustard.	Painful sharp sensation; could not call it taste.
	Curry powder.	Not perceived for one minute and a-half. Painful burning sensation.

These observations show that the sense of taste was not much impaired. Readily soluble substances were sooner perceived than those not readily soluble, but in no instance was there loss of taste. In several instances, there was considerable hesitancy as to the exact kind of taste. For example, saline tastes were not quickly perceived, and common salt was declared on two occasions to have a sweetish taste. The sense of taste was more distinct at and beyond the margins of the cicatrix. In the centre of the cicatrix, tastes were feebly perceived, and the patient reflected for some time before giving an opinion as to the kind of taste. Acids, tannin, and fiery substances, such as alcohol and mustard, gave no sensation of taste, but sensations of burning pain or dryness. The sense of taste was located in an area which could be covered by a sixpence. Here, probably, the substances affected filaments of the glosso-pharyngeal nerves. After careful examination, I could detect no vestiges of circumvallate papillæ in the neighbourhood of the cicatrix.

3. *Sense of Flavours.*—Flavours, relishes, and disgusts were manifested by the patient in a normal manner.

4. *Vocalisation.*—Not having had an opportunity of examining the vocalisation of the patient previously to the removal of the tongue, I cannot offer any comparative observations. The present condition was investigated.

a. *Sounds of the Vowels.*—A (*ah*), *e* (*ā*), *o*, *u* (*ou*), were normal in sound, but strongly resonant. The vowel sound *i* (*ē*) could not be pronounced; but a sound was uttered somewhat resembling *ou*, but deeper, more resonant, and with a grave accent. The loss of the tongue accounts for this peculiarity. In pronouncing *i* (*ē*), the dorsum of the tongue is elevated nearly to the roof of the mouth, just at the anterior border of the soft palate. In *ou*, the tongue is depressed, and there is a considerable interval between its dorsum and the palate. Accordingly, the loss of the tongue lowered the pitch of *u*, and also caused a sound resembling it to escape when the patient attempted to pronounce *i* (*ē*). The patient could pronounce nasal vowel sounds like the French *un, on, ou*, etc., distinctly, as was to be expected.

b. *Sounds of the Consonants.*—The sounds of the consonants were affected by the slight malformation of the lower lip caused by the operation. In the examination of the consonant sounds, I took as a guide the lucid exposition of Professor Max Müller, given in his *Lectures on the Science of Language*, 7th ed., vol. ii, pp. 136-168. I found that all those sounds which do not involve in their production the use of the tongue were apparently normal, but deeper in tone than what is observed in ordinary voices. Those involving the use of the tongue to mould the oral cavity into a special shape were distinctly affected. The mediae (soft or sonant letters), *b, d, g*, were pronounced *bū, uddū, chū*. The tenues (hard letters), *p, k*, were given as *pū, kū*;

but the remaining one, *t*, could not be pronounced at all. A sound was uttered resembling *kū* when the patient attempted to pronounce *t*. The word *loch* (Scotch) was not well given, but resembled *lūgh*. *Ich* (German) could not be uttered. The word *hume*, given by Max Müller as an example of a sound in which "a barrier is formed by bringing the tongue in a more contracted state towards the point where the hard palate begins", was called *ōme*. The word *huge* produced a sound not the least resembling it, as usually pronounced. The words *rise, rice*, were called *rithe, rithe*, with a slight hissing sound intermingling. The letters *r* and *l* could not be pronounced distinctly. The letter *r* had some resemblance to the usual sound, but *l* had no resemblance whatever; thus corroborating the opinion of Helmholtz that, "in pronouncing *r*, the stream of air is periodically interrupted by the trembling of the soft palate or of the tip of the tongue, the peculiar jarring quality of which is produced by these very intermissions. In pronouncing *l*, the moving soft lateral edges of the tongue produce, not entire interruptions, but oscillations in the force of the air." The sounds *ng, n*, called nasal checks by Max Müller, were very imperfectly pronounced. The letter *m* was normal. The letter *w* was called *būbo-ōō*.

c. *Musical Characters of the Voice.*—This was examined by two methods: (a) by tuning forks and resonators; and (b) by König's arrangement of manometric flames and revolving mirror, for resolving into its constituent tones any musical sound the fundamental tone of which is *do*² (128 complete vibrations per second).

(a). By tuning forks and resonators. König supplies five forks tuned to produce resonance when the cavity of the mouth has the shape assumed during the sounding of the vowels. It was found that resonance was very powerful with the forks *u* (*ōō*) and *o*, weak with *a* (*ah*) and *e* (*ā*), and entirely absent with *i* (*ē*). On the patient retaining the shape in which he placed the mouth on attempting to sound *i* (*ē*), the cavity was found to resonate with the fork *ou* (*u*). This observation exactly agrees with what has been detailed regarding the pronunciation of these sounds.

(b). By manometric flames and revolving mirror. This beautiful arrangement, devised and constructed by Dr. König for the analysis of vowel-sounds and other musical notes, is described by him in a paper on Manometric Flames in the *Philosophical Magazine* for January 1873. It serves for analysing sounds (p. 18) "by the visible dissection of sounds by manometric flames. To this end, I construct an apparatus with eight resonators tuned to the harmonic notes of *c*, each of which is connected with a manometric flame. These eight flames are placed in a slanting line one above another, and show, in the rotating mirror fixed in the same direction, eight parallel bands of light when in repose; and when in vibration, eight waved lines. Of course, in this case, each flame must be perfectly independent of the other, and each flame will vibrate only when its particular resonator is put in action by a note in unison; the notes *not* contained in the series of resonators must have no effect whatever on any of the flames." On singing the vowels before the resonators, and turning the mirror rapidly, the resonators analyse the sound; and, by each resonator affected acting on its own manometric flame, the decomposition is rendered visible to the eye by serrations appearing in certain bands of light. The resonators are *do₂, do₃, sol₃, do₄, mi₄, sol₄, 7* (which is a tone having no name, but is twenty-one vibrations less than a minor sixth above *do₁*), and *do₅*. These, from *do₃*, are the harmonics of *do₂*. The quality of voices can by this apparatus be readily demonstrated. Those in which the fundamental tone is powerful, and the higher harmonics weak, affect the lower flames; while those having the higher harmonics affect the fundamental (*do₂*) and the upper set of flames. There are great variations observed in different individuals. In the present case, the higher harmonics were absent, or, at all events, so weak as to produce no appreciable effect on the upper resonators. The fundamental was powerful, and with every vowel showed deep serrations. It was particularly well marked with *u* (*oo*) and *o*. In most voices, with *a* (*ah*), all the flames are affected up the sixth (*sol₄*); the upper three powerfully (*do₄, mi₄, sol₄*). In the patient's voice, with all the intensity he could command, the fourth, fifth, and sixth harmonics were not represented. When he sang out *e* (*ā*) and *i* (*ē*), the fundamental alone was affected. My own voice sounding these vowels shows the presence not only of the fundamental (*do₂*), but of the octave (*do₃*) and the twelfth (*sol₃*). The conclusion arrived at is, that the loss of the tongue has altered the quality of the voice, deepening the fundamental by enlarging the resonating cavity of the mouth, and removing the upper harmonics, which give the qualities of brilliancy or shrillness. For physiological reasons, it is a matter of regret that the musical quality of the man's voice was not ascertained previously to the operation.