only say that they were rare before the age of puberty, still more rare after forty years, most frequent from twelve to thirty years of age. Of size or shape or contour, little can be said. Large size, fusiform shape, smooth contour, were perhaps the properties most common. But of position there can be no question; the lower portion of the bone, and next to this the diaphysis, had the preference. Last of all, the disease may be traced to injury in some few instances.

The tumours of the *tibia* include all three varieties. In no important respect did the three varieties differ among themselves, save in the prevalence of ossification or calcification of the mixed-celled tumours; but in some respects they differed widely from the tumours of the femur. Thus, two of them occurred in patients over fifty years of age, the growth was often slower, the tumour not unfrequently broke through the skin, and the whole course of the disease was milder and less markedly malignant. For, example, the round-celled tumour of No. 22 had already existed many years when amputation was performed. Two years later, a tumour appeared in the calf of his other leg. Three weeks after the removal of this tumour, the patient died from a cachexy which had been very evident before the operation. Another of the patients with round-celled tumour was well sixteen months after amputation through the thigh. Operation appears in some cases to have arrested or delayed the progress of the disease. One of the patients with calcifying mixed-celled tumour was well two years after amputation, performed seven months from the first outbreak of the tumour. Another, a youth of eighteen years, was amputated through the leg by Mr. Croft seven months after the lower portion of the tibia had become the seat of a large soft and pulsating tumour. A year later, the hip was amputated on account of a spongy tumour of the femur, which had been eight months growing. And with this tumour was removed a group of glands, whose size and colour left no doubt that they too were sarcomatous. This is the only case in which glandular affection was present, and here one cannot but think that the gland-disease was due to the tumour of the femur, not to the tumour of the tibia. The viscera were normal at the death of one patient ten months from the commencement of the tumour. The skin in this case, and in another somewhat similar, was broken. Possibly, the ulcer thus formed relieved the tension of the tumour, and, with the relief of tension, the tendency to the projection of cells and fluids into the vascular and lymphatic channels diminished. Affection of the lungs was proved by the necropsy in one case, was indicated by well-marked signs in other cases. In two-thirds of the cases, the upper portion of the tibia was the seat of the tumour, in which respect again the tibia differed widely from the femur.

The *fibula*, too, is most often affected at its upper end. The mixed-celled tumour differed from the other in its calcification and in its generalisation, for secondary tumours occurred in the other calf and in the subcutaneous tissue, not in the viscera. In other respects, the cases were parallel—age, position of tumour, rapid growth, invasion of surrounding muscles, absence of lymph-affection, death within a year, in neither case due to, but in each case in spite of, operation. No. 31 probably died of affection of the lungs.

The five tumours of the *humerus* all grew from the diaphysis, all grew rapidly, all grew along the shaft, yet through the periosteum, which therefore could not have confined them long, into the surrounding parts. That these tumours are exceedingly malignant is shown by the rapidity and manner of their growth, yet none of them produced enlargement of the glands. Two recurred after amputation, a circumstance easily explained by their position and by their extension into the surrounding muscles. Two died from the effects of operation, but, although there were three deaths, only one necropsy is recorded. In this case, the lungs were the only viscera affected.

Of the *clavicle*, there are two cases. In each, the glands appeared to be affected; in each, the surrounding soft parts were involved in the disease; in each, the tumour bore the same opaque-white colour and cancerous appearance. The cases are distinguished by the difference in the position of the disease, and by the somewhat slower growth of the tumour of the older patient.

The three tumours of the *lower jaw* were all spindle-celled, all of females, and of the body of the jaw. Of the first two, each is known to have died with recurrence of the disease, although resection was practised, in one of them two months, in the other three months, after the first appearance of the tumour. No *post mortem* examination was performed in either case, but the glands appear to have been sound.

Although the tumours of the *pelvis* are but three in number, they furnish some features which well may serve to illustrate, not only the pathology of pelvic, but of all subperiosteal tumours. Two of them differed from the third in their affection of the lymphatic glands. In order rightly to appreciate the importance of this circumstance, it must be studied in connection with two facts in which the cases differ, and with certain facts in which they both agree. First, there was a differ-

ence of sixteen years between the ages of the patients, and one of the tumours was a simple round-celled growth, the other a chondrifying sarcoma. These things, therefore, cannot be the cause or the prevention of glandular affection. Next, the tumours were of enormous size, were without capsule, grew into the surrounding parts, filled a large part of the cavity of the pelvis, and were, therefore, brought directly in contact with, and probably grew into, the pelvic glands. These points of concordance and of disparity would be of less moment, were they not so strongly contrasted in the remaining tumour. The very points in which it agrees with one of them are those in which they differ from each other; the very points in which it differs from them both are those in which they most agree.

The bones of the *skull* are subject to all three forms of sarcoma. From whatever region of the skull they grew, there was entire absence of glandular affection, unless that be considered glandular affection which, except that by it certain glands are affected, differs in no way from generalisation by the blood. I mean the affection of glands which lie far distant from the primary disease, not even in the line between it and the main lymphatic trunk. As examples of this, let me adduce two cases (48 and 49) which deserve on other grounds a more extended notice. They are cases of what has been called chloroma or green cancer. The disease commences in the bones of the skull or face, is of periosteal or subperiosteal origin, produces almost always multiple tumours of the skull, runs a most rapid course, producing growths of unconnected and unexpected parts, such as the bronchial and mesenteric glands, the kidneys, prostate, testes, breasts, and lungs, and kills in from three to six months. All the tumours present the same green colour, and round-celled structure. This much at least is gleaned from the recorded cases, which have been well analysed by Huber (*Archiv der Heilkunde*, Band xix, s. 129), who, in 1878, was able to collect but seven of them. Most of the sarcomata of the vault were multiple. They grew, too, as if simultaneously from both aspects of the bone. Yet this occurrence was not, as I believe, due to simultaneous growth, but to penetration of the bone. The direction of growth of any tumour is determined mainly by two factors; first, the resistance offered by the surrounding parts, and next, their capacity for contagion by the tumour elements. The resistance offered by the pericranium on the convex aspect and by the dura mater within must in every case be great, but the bone yields readily before the invading host of cells, its surface is eroded, its spaces are filled with the new growth. Frequent as were tumours of the inner aspect of the skull, death from pressure on the brain was rare. The mixed-celled tumours were so largely composed of fibrous tissue, and possessed so singular a structure, that I have been in doubt whether they were in truth sarcomata. The tumours of the base grew in each case from the body of the sphenoid bone, and differed only in one important respect from the tumours of the vault, that neither of them was multiple.

THE OPERATIVE TREATMENT OF CLEFT PALATE IN CHILDREN.

By HENRY G. RAWDON, M.D.,

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It is not my intention to allude to the past history of the two operations for the cure of cleft palate, namely, that for the closure of the soft palate or velum (staphyloraphy), and that for closure of the bony or hard palate (uraniscoplasty). I may mention, however, that these operations, until within the last twelve or fifteen years, have only been performed upon adults and young persons past puberty. In a few rare instances, attempts have been made to close fissures of the palate in infancy, and in one or two cases with success; but failure has been the rule, and even fatal results have sometimes followed.

The merit of initiating the practice of performing these operations while the patient is under the influence of an anæsthetic is undoubtedly due to Mr. Thomas Smith, Surgeon to St. Bartholomew's Hospital. By the employment of anæsthetics, such operations at once became possible in the case of children, and also of young persons, who might not possess the requisite fortitude to bear a tedious, and in the case of the hard palate, a painful, procedure.

Mr. Smith's happy invention of a gag—so constituted that it not only keeps the mouth open to the required extent, but by its tongue-plate depresses that organ—affords also great facility to the surgeon. In other ways he has simplified the mode of operating, and has devised several instruments and modified others more convenient than those ordinarily employed. Mr. Smith's method of operating was first brought under the notice of the profession in a paper read before the Royal Medical and Chirurgical Society on January 14th, 1868. Since then,

he has published a second paper in *St. Bartholomew's Hospital Reports*, vols. 7 and 8, describing his plan of operating more fully, and giving a series of cases in which excellent results were obtained.

The operative treatment for closure of cleft palate may be undertaken at any age after completion of the first dentition, provided the child be sufficiently strong and healthy. It is not generally prudent to attempt it earlier, as no special advantage is obtained, while the difficulty will be greater, and the chances of success less. It is desirable, however, that the closure should be effected before the child has learnt to talk (this faculty is acquired later than usual in such children); and thus the characteristic defect in articulation has not to be overcome or unlearned. Probably the best age at which to operate is between the third and fourth years.

Congenital deficiencies of the soft palate almost always involve more or less of the palatine portion of the hard; in other cases, the bony palate may be fissured up to or through the alveolar process.

I will endeavour to explain the practice I prefer, and my reasons for adopting it.

In closing a cleft of the soft palate, involving, as is generally the case, more or less of the palatine portion of the hard, I content myself with uniting the margins of the cleft as far forwards only as they can be approximated without traction—that is to say, about the lower two-thirds or three-quarters of the velum. The soft palate in the neighbourhood of the uvula is thick and vascular, and on this account offers facility for union by "first intention", which no other part of the palate possesses; and I believe that, if the cleft velum be closed to the limited extent already mentioned, a successful result may be regarded as almost a certainty.

By following this course, the character of the operation is simplified, and the degree of inflammatory action is proportionately less than if the closure of the upper or palatine portion of the cleft were attempted at the same time. In the latter case, the use of the raspatory would be called for, and lateral incisions, at the junction of the hard and soft palate, would also be required. It cannot be doubted that this additional manipulation might unfavourably affect the chances of union.

When a soft palate, or lower portion of it, has united, it readily accommodates itself to its new position and is free from tension, the improvement of its condition being well marked and progressive during the first few weeks.

As an argument in favour of the practice I advocate, instances have occurred in which, within two or three weeks after the successful closure at one operation of a fissured palate, owing to excess of tension, the united margins of the cleft have been suddenly torn asunder during some violent effort, such as vomiting, or swallowing hastily too large a lump of food. This undue tension may also, as Mr. Francis Mason has observed, nullify the good effect of the operation, so far as an improved character of the voice is concerned. I am inclined to the opinion that neither of these unfortunate results would take place, if the surgeon contented himself with uniting only the lower two-thirds or so of the soft palate, and waiting a reasonable time for it to accommodate itself before completing the cure.

A foramen so formed (by leaving the palatine portion of the fissure unclosed) has a tendency to diminish spontaneously, and its subsequent closure is not attended with difficulty. Lateral incisions and the use of the raspatory are needful, as it is essential that the vivified margins of a foramen come together without the least traction. When extensive fissure exists, whether up to the intermaxillary bone or through the alveolar process, I still prefer only to close the velum at the first operation, and to allow a sufficient interval to elapse before curing the hard palate.

It is recommended by Mr. Smith and other surgeons, whose opinion is well entitled to consideration, to close the entire fissure of soft and hard palates at one operation; and, if the cleft be not too wide, this may frequently be accomplished. As a rule, however, I think it better to make sure of closing the velum, than to run the additional risk of failure by attempting to close the entire fissure. When this is undertaken, the very manipulation necessary in separating the flaps of muco-periosteum may occasion such a degree of inflammatory reaction as to cause partial or complete failure of the operation. On the other hand, the healthy tissue of a sometime united velum will greatly assist in securing the union of the flaps detached from the bony palate; and not only so, but, once the velum is closed, the subsequent operation on the hard palate becomes easier of accomplishment. As time goes on, the cured soft palate has a remarkable action in diminishing the width of the fissure in the hard, more especially its posterior portion. It is noticeable that the nearly vertical sides of highly arched palates will, in a few months, assume a more flattened or horizontal position.

It must be acknowledged that Mr. Thomas Smith has done much to simplify the operation for the cure of cleft of the hard palate. That

this is so, will be seen when the extensive lateral incisions of the palate, as commonly practised, are contrasted with the limited ones recommended by him. The usual plan is described thus: this incision should be close to, and parallel with, the alveolar ridge, and extend from a point opposite to the last molar forwards to the canine tooth; whereas Mr. Smith practises a small incision of from an eighth to two-thirds of an inch, which he directs to be made parallel to the margins of the cleft, and sufficiently far from the neighbourhood of the teeth to avoid wounding the vessels running between the anterior and posterior foramina, in the palatine groove near to the alveolar process. Mr. Smith's incision is thus obviously internal, while by the usual direction it would be external, to the palatine vessels; and consequently the chances of wounding these vessels are manifestly less.

The ordinary raspatories, Mr. Smith says, are too large to be employed in the case of children. He prefers a smaller kind, and remarks that a Holden's director and a steel aneurism-needle are often all the instruments really necessary for separating the flaps of muco-periosteum. Respecting the selection of suture-material for the hard palate, no doubt fine silver wire is the best; but, for the velum, silk, fishing-gut, silver wire, are all used. Mr. Smith himself prefers horsehair, that suitable for fishing-lines, previously soaked in water; but silver wire has answered so satisfactorily in my hands, that I am not disposed to change it for any other material. It and horsehair are specially un-irritating, and consequently may be allowed to remain in the palate almost indefinitely; while silk sutures need early removal, obviously an objection, as it is imprudent to interfere with a recently united and more or less inflamed and irritable palate.

The following is an outline of the steps to be taken when operating upon the soft palate. Anæsthesia having been induced, and the hands secured to the hips, the gag is introduced and held in position (not tied), and the mouth opened to the required extent. The mucous membrane is freely pared from the margins of the cleft from below upwards. I use fine silver wire sutures, inserted from below upwards, which are made to pass through both sides of the fissure at one transit, with the aid of Mr. Smith's tubular needle—a modification of Marion Sims's vesical fistula needle. A small curved needle held in a holder is useful for the uvula.

The palate should be touched as seldom as possible with the forceps. By holding the ends of the suture last inserted, the next can be passed with facility, and the use of the forceps avoided. The sutures may be inserted about a quarter of an inch from each other, and about one seventh of an inch from the margins of the cleft: they are secured by twisting. An instrument, terminating in a short double cannula, through which the ends are threaded, is convenient for this purpose. The ends should be cut off as close as possible to the palate. The gag requires removal from time to time during the operation, and the mouth and fauces cleared by syringing. In doing this, the patient must be turned well over and the face held downwards. Should attempts at vomiting occur, they must be met in a similar way. Sponging is to be avoided as far as possible, as it excites the flow of secretions from the fauces.

In the simpler cases of fissured velum, neither division of the palatine muscles nor lateral incisions are required. The wire sutures, if there be no traction on the margins, will control muscular resistance. In the severer cases, where the gap is wide, or where the hard palate is partially or completely fissured, I adopt Mr. Pollock's method of restraining muscular action. This plan is fully described in Mr. Holmes's *System of Surgery*, vol. iv, page 427. I prefer, however, to practise it after rather than before paring the edges of the cleft. It consists of a puncture of the palate, a little internal to, and in front of (*i.e.*, above) the hamular process, while it is held on the stretch. The knife is made to cut the posterior or pharyngeal aspect of the velum more freely by raising the handle in the act of withdrawing it. This incision divides some fibres of the tensor and levator palati, and is effective in paralysing muscular action. If further freedom be needed, the pillars of the fauces (palati glossi pharyngei) may be cut across on each side.

I may here remark that in all cases of closure of the soft palate, whether simple or complicated, when a point is reached where another suture cannot be secured without tension, I at once desist, rather than practise lateral incisions, preferring to leave what remains to be done for a subsequent operation.

The operation for closing the hard palate is performed as follows; and what has already been stated as preliminary in the case of the soft palate holds good in the hard. The edges of the cleft are freely pared from behind forwards, but cutting obliquely rather than vertically along the bony margin. The incision for the raspatory, which need not exceed half-an-inch in length, is made about midway between the alveolar process of the first molar tooth and the margin of the cleft and parallel with it. It is gently worked under the muco-periosteum:

till it appears in the cleft; and, to complete the separation, an aneurism needle can be conveniently employed from within the cleft so as to meet the raspatory, which latter can be withdrawn. At the point where the hard and the soft palate unite, the flaps are always firmly attached by a process of fascia to the posterior margin of the bony palate. The separation at this spot can only be satisfactorily effected by a cutting instrument, and for this purpose a pair of short-bladed angular scissors is useful. One blade is passed under the flap between it and the bone, and the other through the cleft over the nasal surface of the palate. This includes the fascia, and entirely frees the flaps. The sutures are inserted with the tubular needle, and managed in a precisely similar way as in the soft palate. They may, however, in some cases be allowed to remain in a few weeks longer with advantage. In highly arched palates, the flaps are often redundant, the margin being readily approximated; while in broad and flat palates, the incisions for the raspatory will need free extension, both backwards and forwards, leaving an elliptical gap of considerable width on each side. In carrying the incision backwards, care must be taken to avoid the neighbourhood of the posterior palatine canal, or troublesome hæmorrhage may ensue. In cases of complete cleft with harelip, I think an advantage is gained by closing the soft palate first, and in a few weeks' time, operating upon the lip. The latter having been cured, the margins of the cleft in front and the alveolar process come together with comparative rapidity. It is desirable, however, to defer closing the hard palate for some months. With regard to the after-treatment, nothing very special is required. It is by no means necessary for the patient to remain in bed beyond a few days. The diet should consist of fluid and unstimulating food, and, for the first week, principally milk. Afterwards, more solid food, provided it be made soft, may be freely allowed. After these operations, I prefer the patient having moderately warm, rather than iced drinks, believing that harm may possibly result from the latter being persisted in. I follow Mr. Smith's judicious advice, and refrain from inspecting the palate for the first few days after operations. The sutures should not be interfered with for at least two or three weeks, after which they can be readily removed, all sensitiveness having passed away.

I append a brief outline of a few cases which have been under my charge at the Liverpool Infirmary for Children. On each occasion, chloroform was the anæsthetic employed.

CASE I.—*Cleft of the Velum and of the Posterior Third of the Hard Palate.*—Milly P., aged 3, an apparently healthy but really delicate child. On August 28th, 1877, I closed the whole cleft, using silver wire and silk sutures alternately. The raspatory was employed to free the flaps from the bony palate. The margins of the cleft came together without tension. On the fourth day, I found that union had failed. The edges looked unhealthy, and the entire palate was in a very inflamed condition. Convalescence was retarded by troublesome diarrhoea.

CASE II.—*Cleft of the Velum and one-third of the Hard Palate.*—Alice L., aged 7. On January 19th, 1878, I closed the soft palate only, adopting Mr. Pollock's method of paralyzing muscular action, and using silk sutures, except at the base of the uvula and at a point in the cleft as far forwards as the margins could be brought together, where I substituted silver wire. On the fifth day, all had well united; but on the sixth, the silk sutures appeared to be causing so much irritation that I considered it desirable to remove them. In doing so, the union of the uvula gave way up to the silver suture. At the end of the third week, the two silver stitches were removed, all the soft palate brought together being firmly united, the uvula excepted. On October 26th, I closed the foramen, which in the meantime had considerably diminished in size, with three silver wire sutures, making lateral incisions and using the raspatory. On inspection, a few days afterwards, the foramen was found to be quite closed. On November 16th, I united the bifid uvula, using very fine silver sutures. The result was quite satisfactory, the whole of the cleft being now completely closed. There is well marked improvement in the child's articulation since the first operation.

CASE III.—*Cleft of the Velum and Hard Palate up to the Intermaxillary Bone.*—Michael B., aged 3, a healthy child, had a cleft of considerable width; but the mouth was peculiarly small. On March 23rd, 1878, I closed the velum as far forwards as I could without tension, using silver wire for all the sutures except the upper two, which were of fishing-gut. I adopted Mr. Pollock's incisions, and divided the pillars of the fauces. On the fifth day, it was found that union had taken place where the silver wire was used, but the gut sutures had ulcerated out. A very serviceable soft palate was the result. On September 14th, I closed the hard palate, except the extreme anterior angle, carrying the incisions for the raspatory well back, as the cleft was a wide one. On the fourth day, union appeared to have taken place; but on the evening of the fifth, hæmorrhage came on, which soon ceased without interference. On inspection, a few days later, I found that the palate had remained closed, leaving, however, two small

foramina. On the child's readmission, a mild attack of scarlet fever prevented an attempt from being made to close these foramina, and he has not been brought to the Infirmary since.

CASE IV.—*Cleft of the Velum and the Posterior Half of the Hard Palate.*—William B., aged 3. On admission, the child was healthy, but had an irritable cough, and the operation was deferred until this was better. On September 21st, 1878, I closed the whole cleft, following Mr. Pollock's method of restraining muscular action, and making lateral incisions parallel to the margins of the cleft, through the upper part of the soft palate and through the muco-periosteum of the palatine portion, freeing the flaps with the raspatory. I used silver wire sutures. The margins of the cleft came fairly well together; but, unfortunately, next day the cough returned. On examination, a few days later, I found the soft palate had given way, but nearly all the hard had united. On November 2nd, I made a second attempt to close the velum, or rather the lower two-thirds of it, again adopting Mr. Pollock's incisions, and on this occasion dividing the pillars of the fauces. Silver wire was employed for sutures. The foramen thus formed was nearly circular, and over half-an-inch in diameter. The result of this operation was quite successful. On October 11th, 1879, I closed the foramen, which at this time appeared as a mere slit a quarter of an inch in length, and the edges even touching.

CASE V.—*Cleft of the Velum and half-an-inch of the Hard Palate, with Harelip which had been closed in Infancy.*—Harold S., aged 3, a rather delicate child from the country. On August 24th, 1878, I closed the velum to within a quarter of an inch of the bony fissure with fine silver wire. No muscles were divided nor were any incisions made. It united perfectly, and the sutures were removed at the end of the third week. On April 24th, 1879, I closed the foramen with three silver sutures, making lateral incisions and using the raspatory. The cleft in the palate is now completely cured, but on the left side there is a small hole, the result of an accidental tear made by the raspatory; this can be closed at any time.

CASE VI.—*Complete Cleft of Hard and Soft Palate, and of the Right Lip and Nostril.*—William C., aged 11, first came under my notice, suffering from vesical calculi; and lithotomy being performed, two moderately large stones were extracted. After convalescence, he returned home for a few weeks. On November 16th, 1878, I closed the cleft in the velum, following Mr. Pollock's plan of incising the palate. Silver wire was used for sutures. The fact of the hare-lip existing greatly facilitated the operation, allowing ample light and room to work in. The result was quite satisfactory; and on the twenty-first day, the sutures were removed. On December 4th, I closed the hare-lip without interfering with the alveolar process in any way, well freeing the soft structures on each side from their bony attachments. The cure of the lip was satisfactory. The boy returned home for five months; and on May 10th, 1879, I closed the hard palate. The cleft in the alveolar process had meanwhile closed spontaneously; before the hare-lip was operated upon, it was fully half-an-inch wide. The sutures were removed at the end of the fifth week. All the palate is now closed, except two small holes; one at the point where the hard and the soft palate meet, the other at the anterior angle behind the alveolar process. The articulation, which previously to closing the fissure was absolutely unintelligible, is now very considerably improved.

THE TREATMENT OF ASTHMA.

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I.

FROM the earliest days of the history of medicine until the present moment, narcotics, antispasmodics, *et hoc genus omne*, have been, severally or in endless combinations, and with no sparing hand, applied to every orifice of the body for the purpose of subduing the nervous irritability supposed to be the essence, or at least the chief element, of asthma; and yet, notwithstanding the indubitable efficacy of these remedies, the records of medicine contain not one single instance in which that practice has produced, at best, a more than temporary benefit. Enthusiastic therapeutists, it is true, allege that in some cases antispasmodic fumes, a certain mixture taken three times a day, and a certain pill at night, have led to the happiest results; but the remark they add, that the patients had to carry about with them their panacea, to be used with every recurrent attack, somewhat obscures the brilliancy of their success. The bulk of practitioners have been less fortunate in their experience as regards relief or cure of asthma; and their opinion that this is the most intractable of all diseases is unhappily in strict accordance with facts.

No sadder impression can be received than by studying what is still