associated with a risk of glycosuria which from small beginnings may end in a permanent diabetes. Intestinal difficulties are common and the colon may prove troublesome. Pigmentary changes in the skin may declare themselves in the form of leucoderma, and patches of alopecia sometimes become established on the scalp.

Here again we have three examples of climacteric disease in women with an inter-allied relationship no less notable than that found between the examples selected for illustration as being frequent in men at the corresponding period of life. The causative influence in all three is probably a toxæmia by which metabolism is more or less seriously interfered with. The toxic process has been going on over many years with passing increase or diminution of virulence according to the demands made upon the resisting powers of the individual. Finally, when the menopause arrives and temporarily disturbs the equilibrium of health, the toxins concentrate their energies and produce symptoms indicative of selective intensity in one direction or another according as it is guided by inherited tendency or personal idiosyncrasy. The nervous system has to bear the primary weight of the pathological condition, and we find in each of the cases quoted, just as in those exemplified by men, an irregularity of nerve supply which, added to the organic changes that have taken place, complicates the symptomatology and increases the uncertainty of the prognosis. These ailments are apt to overlap one another, and more frequently present themselves as a united clinical picture than as a true-to-type malady. Colitis enters into the make-up of the story of many cases of rheumatoid arthritis, which, in its turn, is often an associate of hyperthyroidism, while all three may find full expression in the same patient. The following case fully bears out this statement:

CASE VIII.

M. P., aged 63, a spare, active woman, who had suffered for some years from chronic rheumatism, and gave a history of temporary glycosuria about ten years ago. She complained of recent loss of flesh, weariness, constant palpitation, and irregularity of the bowels, with recurring attacks of colicky pains, diarrhoea, and mucus-coated, blood-stained stools.

On examination her terminal finger-joints were deformed by Heberden's nodes, and several of the interphalangeal joints were spindle-shaped and enlarged. Each hand was deflected to the ulnar side, and there was wasting of the interosseous muscles. The lungs were moderately emphysematous, and the chest was rigid. The heart was enlarged, but the apex beat was difficult to find because of the overlapping lungs. There was a systolic murmur at the aortic cartilage, and the second sound was accentuated. The arterial tension measured 140 mm., and the pulse was of the Corrigan type; it never numbered less than 120, and on many occasions ran up to 140. There was a constant tremor, varying in intensity. The colon was tender throughout all its course, and was thickened at the caecum and over the splenic flexure. No glands were felt. The urine was straw-coloured, of 1037 density, and contained 22 grains of sugar to the ounce, but no diacetic acid.

During three years after this note I saw her from time to time. She gradually developed a diastolic aortic murmur, and her left lens became cataractous. She went repeatedly to Harrogate, and derived benefit from the treatment there so far as the colitis was concerned. She had occasional recurrent attacks of mild arthritis, and the amount of sugar varied from time to time, but never exceeded 25 grains to the ounce. Latterly, she developed a mild albuminuria. Eventually she died of pneumonia.

If climacteric illnesses in women do not so clearly indicate as in men the advent of degenerative tissue changes, the toxæmia on which they depend cannot fail in time to have a debasing influence on all the cells of the body. The conditions of her life are generally less arduous than in man, and the climacteric period is reached earlier. Her vital energies are therefore better preserved, and her tissues have not yet begun to degenerate.

She may get arterio-sclerosis, or interstitial nephritis, but it is generally later than at the time of the menopause. On the other hand, the glycosuric liability may develop earlier than in man on account of her proclivity to thyroid mischief. Metabolic failure to deal with carbohydrates has, in her case, a thyroid, rather than a pancreatic, origin.

A few sentences only need be added in regarded to treatment. One leading indication is, from the preventive aspect, important—namely, the necessity for combating in every possible way toxæmic intoxication. This is most likely to be successfully accomplished by a careful regimen; the proper regulation of the bowels and the occasional stimulation of the liver; a suitable amount

of daily exercise in the open air; avoidance of worry and excessive fatigue; and by an attempt, through the use of intestinal antiseptics, to keep the whole length of the digestive tract clean and wholesome. In cases of colitis douches are sometimes useful, but they are an unpleasant form of treatment for the patient and may create an undesirable reflex effect upon a nervous system already touchy. Beta-naphthol, bromide of ammonium, and bismuth is a useful combination, the good effects of which will be intensified by an occasional dose of calomel or podophyllin. The bowel should be lubricated by a tablespoonful of liquid paraffin every morning before breakfast. The wearing of a suitable belt during the day supports the abdominal wall and helps to keep the colon in its place. Since it is probable that rheumatoid arthritis owes its origin to gastro-intestinal poisoning, the same treatment as is helpful in colitis applies in its case. It has been claimed that guaiacol carbonate is specially useful, but it is probably no more effective than the other antiseptics already mentioned. Hot-air baths at home are of value, and residence during the cold months of the year in a warm and dry climate such as that of Egypt is desirable. The vogue of modern remedies has caused many of those that are older to be forgotten or rejected as obsolete, but it is well to remember the efficacy of guaiacum in combination with sulphur, given in such a daily dose as provides for a comfortable and easy morning evacuation. In cases of hyperthyroidism, the usual treatment by bromides, strophanthus, belladonna, and arsenic, is greatly aided by the administration of suprarenal or thymus gland extract. The results are often brilliant, and improvement may follow their use when all other methods of treatment have been unavailing. Which will prove the more helpful in any given patient can only be ascertained by the experimental exhibition of first the one, and then, if need be, the other. There seems to be no guiding indication as to choice, and not uncommonly when one fails the other succeeds. Absolute rest in bed or on the sofa for three or four weeks is an essential element in the treatment of all these cases, and they seem to do better in a relaxing inland climate than at high altitudes or near the sea.

A clinical survey such as this compels us to recognize how important, in both sexes, is the climacteric period of life, and how essential it is to treat the ailments which may accompany it with perseverance and careful attention to detail. The secret of success lies in convincing the patient that the years are beginning to tell their tale, and that a new and more subdued plan of life must be found and courageously adopted in order to escape the danger of a too early advent of the time when "the grasshopper shall be a burden, and desire shall fail."

BONE GRAFTING IN UNUNITED FRACTURES OF THE MANDIBLE:

WITH SPECIAL REFERENCE TO THE PEDICLED
GRAFT.*

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THE evolution of the bone graft as applied to ununited fractures of the mandible is a matter of considerable interest. Since the outbreak of war orthodox opinion has undergone a radical change. The extent of this change can be gauged by a perusal of the *Transactions* of this Section. At a meeting of this Section in 1916 bone grafting as a means of dealing with non-union was mentioned merely for the sake of academic completeness. Practically, it was either ignored or regarded as a manifestation of somewhat ill-advised activity on the part of surgical visionaries. Compare this view with that deliberately voiced last session by the then president of this Section. In March, 1918, Mr. J. H. Badcock summed up the position

* Read at a meeting of the Section of Odontology of the Royal Society of Medicine, November 25th, 1918.

thus: "It is evident from the collection of cases on view this evening that the operation of bone grafting as a cure for ununited fractures of the mandible has passed beyond the experimental stage into the region of assured success in a very large proportion of cases. But such success can only be expected when a surgeon and a dentist work in close and sympathetic collaboration, with the full understanding of each other's aims and efforts. No surgeon dealing with fractured jaws can afford to neglect this operation, and no ununited mandible should be given up as hopeless until it has been given a fair trial."

Unfortunately this finding, based on the evidence of results, has been by no means universally adopted. Thus, in an article in the *British Journal of Surgery*, July, 1918, which deals with the treatment of cases at a recognized jaw centre, this statement is made: "Fibrous union is treated by a suitable prosthetic appliance." It is obvious that the treatment of non-union has not been standardized. Opinion tends to the condemnation of the *non possumus* attitude that characterized the earlier days of the war, but procedure is neither settled nor consistent.

How important it is to formulate a consistent, clear-cut policy must be apparent to all. The treatment of ununited fractures is essentially a peace problem. The exigencies of warfare can no longer be invoked to extenuate procedures that fall short of the best, either in plan or in execution. Throughout four years of war the simpler cases have been dealt with to a finish. The clear supernatant fluid has, as it were, been drawn off, leaving a precipitate of remediable or hopeless non-unions. How numerous are these cases, and how have they been dealt with? We are unable to answer those questions, but certain facts can be adduced to show how necessary it is that they should be answered. As to their number, information is very scant, but certain figures are available. Northcroft had 10 per cent. of non-unions in his series; Forty had 16 per cent., and we, counting all types of cases, had 11 per cent. It may fairly be estimated that non-union occurs in approximately 10 per cent. of all mandibular fractures. If this be so, the number of ununited fractures must be considerable, for over 1,300 cases have been treated at the King George Hospital alone. The constant appeals made for statistics bearing on this question have, as noted, evoked but little response.

That non-union can only be remedied by operative measures is an admitted fact. To what extent and with what success surgical intervention has been invoked it is impossible to judge, for the only series of cases other than our own is that published by Platt, Campion, and Rodway. This much is certain, that for at least two years after the outbreak of war isolated attempts only were made to deal surgically with these lesions. As a rule, the attitude assumed by those in charge of these cases was expectant and non-committal, but occasionally active hostility was encountered.

Taking all these circumstances into consideration, one must conclude that a large number of ununited fractures have been discharged from hospital, their treatment being allegedly completed. Let it be remembered that no surgeon would regard non-union of any other bone as a satisfactory termination to treatment. Let it be remembered, too, that the disability from an ununited fracture of the mandible tends to become progressively greater as teeth now used for abutments are lost; also, that the maximum of disability will obtain at an age when the compensatory powers of the individual are on the wane. Remembering these things, we maintain that every case so situated should be carefully reviewed, and that wherever possible the condemning dictum should be revoked. Let us quote a striking passage from Mr. John Galsworthy in the first number of *Reveille*:

Be not trustees of your own departments first, and servers of the general purpose second; keep the restoration of the wounded man in the forefront of your minds and sacrifice everything else—even your own dignities—to that. Restoration of the man and nothing else matters.

The benefits derived, the chances of success, the penalties attaching to failure, the risk incurred, the methods to be employed—such questions as these must be investigated, and upon the answer to them will depend that settled conviction which must necessarily precede the consistent adoption of any fixed plan of treatment. In short, a verdict, favourable or otherwise, must be based on the evidence of results.

It is on that account that we have brought for your inspection every available case, irrespective of their condition or the date of operation. These cases number twenty-three, and include nineteen pedicled grafts and four free transplants. In addition, cases have been shown which are regarded as suitable for one or other of these grafting operations.

The proportionately large number of pedicled grafts will be noted. We have employed this method in thirty-four cases. Free transplants have been employed in twelve cases only. The latter method is only adopted when a pedicled graft cannot be utilized.

The pedicled graft operation has been described in previous communications,¹ and it is therefore not necessary to recapitulate the details. The use of this method has been extended to the utmost, and as a result certain improvements have been introduced. It is now usual to perforate the graft posteriorly (Fig. 1, A, B, C). The fixing wire is passed through the substance of the bone, instead of surrounding it, and thus firmer and more reliable contact is obtained. At times both ends of the graft are perforated. Experience has shown that a much more bulky fragment may safely be detached than we were wont to use. For both of these improvements we are indebted to Captain Tainter of the United States Medical Service, whose valuable assistance has been placed at our disposal.

Another point not previously emphasized is the rigidly aseptic method employed. Skin margins are guarded by towels clipped to the edges of the wound; all knots are tied with forceps and no handling of wound or graft is at any time permitted. Some may maintain that such technique is totally unnecessary and savours of surgical pedantry. It is, however, well to remember that the standard aimed at is rarely attained and that within limits it is impossible to err on the side of a too rigid technique. That the precautions taken are well within these limits is shown by the fact that the operation rarely takes more than one hour and a quarter and is often completed in fifty minutes.

We propose briefly to summarize the conditions our experience shows to be necessary to permit the performance of a pedicled graft operation.

1. *Site of Fracture.*—The loss of tissue must implicate the horizontal portion of the bone—that is, the lesion must be situated at or in front of the angle.
2. *Size of the Gap.*—This should usually not exceed 4 cm. In favourable circumstances it is possible to cut a thick, well-nourished graft of 6 cm. in length, and a gap of 5 cm. (before trimming) may thus be dealt with, if end-to-end union is resorted to.
3. *Condition of the Soft Parts.*—It is necessary that the tissues of the submaxillary triangle should be free from scar tissue on the side from which the graft is to be cut. It is extraordinary how frequently this area escapes even when the soft tissues of the face are extensively damaged.

Nothing has been said as to the more precise situation of the fracture because a lesion on one side can be dealt with by a graft taken from the opposite side. The ability to do this has been demonstrated on several occasions. It entails a considerable dislocation, the definition of a long pedicle, and a consequent tendency to displacement. In two cases of this nature with maximum gaps the results, though good, have not up to now been entirely satisfactory. In both cases the lower jaw was edentulous and atrophic, thus seriously limiting the amount of bone detachable; in both cases the operation was undertaken through scar tissue, and in neither case were perforating wires utilized. In extending the application of an operation a limit must be reached, and reached, in our judgement, it has been in the cases detailed.

FIG. 1.—A, Diagram of fracture. B, Graft cut. Posterior fragment freshened and wire passed. C, Graft fixed in position. Pedicle shown schematically.

It is impossible to refrain from commenting on the technical difficulties forced upon the surgeon by the edentulous jaw. The cases here to-night show how rapidly these jaws become frail and atrophic, militating thus against grafting by any method and adding to this nutritive difficulty the technical one of efficient fixation of the fragments. We are glad to note that, amongst others, Major Pickerill has joined his protest to those we have made from the earliest period of the war, and we take this opportunity to reiterate our conviction that the multiple extraction of teeth is a policy that should be abandoned.

A brief statement may be made as to the progress of these cases. Without exception, they have been out of bed before the skin stitches have been removed. Progress has been throughout uneventful; an alveolar abscess occurred in one case and stitch sinuses in two others. The splints are removed in from ten to twelve weeks according to the size of the defect. At this time a slight "give" is noticeable corresponding to the plastic stage that occurs in the union of all fractures. As a rule, this bending phenomenon gradually disappears, and firm union ensues in from four to six months. Occasionally union fails at one or other end. A secondary wiring operation is then undertaken. This has been invariably successful, and the graft when exposed has been indistinguishable in appearance from other living bone. The overlap originally present permits of this secondary operation being performed without any sacrifice of occlusion.

An interesting departure is the treatment by a pedicled graft of two cases in which previous free transplants had considerably diminished the gap but had failed to determine union. A case of this description was grafted in Switzerland. He came to us with free mobility but with a gap that could readily be bridged by a pedicled graft. A sinus was present at the time of operation but no untoward effect has been noted.

It has been stated that 34 cases have been dealt with by this method. In 23 the result is known, and of these 21, or over 90 per cent., have been completely successful. In the two remaining cases the patients themselves are thoroughly satisfied, but we can only regard their condition as considerably improved; they are counted as failures in the appended table of results. The pedicled graft operation permits the utilization of a portion of living bone, possessed of its own blood supply, passing to it from a natural musculo-fascial pedicle. The method of Cavalé, for which similar claims are made, cannot justly be regarded as a pedicled graft operation. The results support this contention, for they have been far from satisfactory.

Free transplants are only employed when conditions do not permit the use of a pedicled graft.

Apart from the question of technique, the factors that determine the success of a free transplant may be dealt with as follows:

1. *The Condition of the Soft Parts.*—The operation should not be attempted in the presence of frank or concealed sepsis. We always allow three months to elapse after obvious sepsis has disappeared. As the graft is not vascularized from the bed in which it is implanted the vascularity of the bed is not of direct importance. All that is required is that the soft tissues shall be pliable enough to permit nice adaptation of the graft, and well nourished enough to maintain their vitality when sutured, and thus prevent the introduction of sepsis from without. Excision of puckered and adherent scars is frequently necessary, and plastic operations should be so planned that exposure of the bone ends may be accomplished without undue risk of opening into the mouth.

2. *Condition of the Fragments.*—The size of the gap is not material as an isolated factor. We have successfully dealt with a case in which the graft, 7 cm. in length, extended from the facial vessels on one side to those on the other. The condition of the fragments is most important, both from the point of view of reparative power and the facilities afforded for efficient immobilization. The ends of the bone always tend to become atrophic and sclerosed. This process is progressive, and hence any undue delay seriously diminishes the chance of success. The age of the patient, too, is a most important factor. Delay, then, on both these counts is to be deprecated. So convinced are we of this that we urge operation after a reasonable trial of more conservative methods. This is a question that vitally affects the welfare of the pensioner. The treatment of old non-unions brooks no delay, for every day that passes steadily diminishes the chances of success. The edentulous fragment is an even more burdensome difficulty than in the case of the pedicled graft. If we were asked to state what single item in the treatment of jaw cases had given rise to the most difficulties, disappointments, and failures, we should unhesitatingly answer—the indiscriminate extraction of teeth.

3. *The Graft Itself.*—This may be taken from tibia, rib, crest of ilium, or scapula. In short, the graft may be taken from any bone, the choice depending on accessibility and the physical disposition of the portion removed to conform to the shape and size of the gap and to the methods of fixation employed. The presence or absence of periosteum is not material, as our cases conclusively demonstrate. The results obtained do not compare favourably with those by the pedicled graft method—hence our preference for the latter. In the case of the long bones, Hey Groves has recently published a series of 34 cases with complete success in 55 per cent. In the series of Platt, Campion, and Rodway the results were extremely satisfactory, and the authors are to be heartily congratulated. The osteo-periosteal method of Delagenière has, according to reports, given extremely good results. A series of cases grafted in this manner was the subject of a paper by Lebidsky and Virenque at the Inter-Allied Conference. These same authors discuss the method very fully in the book recently published by them. Further information is required as to the size of the gap that can thus be dealt with successfully.

Of our own 12 cases the result is known in 10, and of these, 7 have been completely successful, giving a percentage success of 70. Splints are removed in from three to six months. Progress is slow, and firm consolidation cannot be expected in less than six months to a year.

We have questioned the earlier patients in both groups as to their present function. Ten replies only have been received. All state that the jaw feels solid; five of these (all pedicled grafts) are on ordinary hard diet; four of these state explicitly that they "can eat anything." As regards the other five the replies are disappointing. One can eat meat if stewed (free transplant); the other four (two pedicled and two free grafts) can only eat meat if minced. This question of subjective evidence is beset with difficulties. When the evidence is positive—when a man states that he can eat anything, that statement obviously can be accepted without demur. The same cannot be said of negative evidence. In several cases we know, from observation, that such negative statements have been incorrect. Unsupported negative statements are open to question when at variance with what clinical examination would lead one to expect. The reasons for this are obvious, and will be appreciated by all those present who have knowledge of the working of the Workmen's Compensation Act.

From conversation with our most intelligent patients we are convinced that disability is a muscular failing. When it is remembered that many of our cases have been under treatment for two years, coming to us after a year or eighteen months in splints, this muscular disability is scarcely to be wondered at.

A man with a compound fracture of the femur can perhaps get about fairly well at the end of six months; one does not expect him to be able to play football. Football to a femur is as hard food to a jaw, and we think that, even with union, some functional disability will frequently be long-standing. Ability to masticate is restored invariably to the sound side first, an ability which, in the presence of mobile non-union, is impossible. On the affected side ability is delayed—the jaw, as it were, walks with a limp.

The position as regards all cases of non-union dealt with by us may be tabulated thus:

Nature of Operation.	No. of Cases.	Result Known.	Failure.	Success.
Plating	2	2	2	0
Wiring	20	20	1	19
Pedicled graft... ..	34	23	2	21
Free transplant	12	10	3	7
Operation abandoned	3	3	3	0
Total	71	58	11=19%	47=81%

No selection whatever has been exercised; we have operated on every case submitted to us. It will be noted that the balance is heavily weighted against ourselves. Thus three cases are counted as failures, in which the physical conditions found by exploration rendered, in our judgement, any further steps impracticable. Again, no "improvement" column has been included, though in most cases improvement has been considerable. In no case has the patient's condition, general or local, been

adversely affected by operation. Finally, there has been no mortality, and no complication of a nature to cause alarm.

REFERENCE.

¹ Hunterian Lecture, *British Journal of Surgery*, July, 1918. *Transactions of the Odontological Section, Royal Society of Medicine*, March, 1918.

PELVIC MEASUREMENT IN ANTE-NATAL CLINICS.

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THE following notes have been written in the hope that they will prove of use to those engaged in frequent and routine examination of the pregnant woman. One of the first objects of the work in the ante-natal clinics is the measurement of the pelvis and the recognition of contraction in order that obstetric disasters may be anticipated, and therefore prevented.

The importance of complete pelvimetry in every primigravida and all multigravidae with a history of instrumental or difficult delivery cannot be overestimated, for during the course of such routine examination it is surprising to note that a relatively large number of women show degrees of pelvic contraction which are slight, but sufficient to cause a difficult labour. The grosser degrees of contraction are usually recognized easily, and adequate prophylaxis arranged, but so much may be done for the less marked cases by accurate recognition followed by timely induction of labour, perhaps only a week or two before term, but yet long enough to prevent the risk of fetal death during a tedious delivery.

If measurement of the pelvis were a certain means of knowing the size of the brim the examination and its judgement would present little difficulty, but, unfortunately, in the slighter degrees of contraction the measurements often give no true information, and if reliance be placed upon these figures, and no further examination be made of the manner in which the head is behaving in or above the brim, there may be surprise at the time of labour that a difficult forceps delivery is required. The converse also is true—that a pelvis apparently, by external measurements, contracted is found to offer no impediment to the subsequent passage of the head.

The usual measurements made during an ordinary examination are three, together with an attempt, generally unsuccessful, to estimate a fourth. Of the three two concern the false pelvis—namely, the interspinous and the intercrystal diameters; but these measurements are of little value—in fact, scarcely worth the trouble of recording except when altered to a marked degree, in which case other diameters give more information.

The interspinous is described in the books as 10 in. (25 cm.), but it seldom reaches this figure, and may vary from 8½ in. (21 cm.) to 10 in. (25 cm.) in a pelvis with a basin normal in size. It is most commonly a little over 9 in. (22.5 cm.). The intercrystal is a little more constant, between 10½ in. (26 cm.) and 11 in. (27.5 cm.), and diminution of this diameter may be of more consequence as indicating a contraction of the transverse diameter of the brim, and therefore a generally contracted pelvis. It is probable that if ½ in. (1.25 cm.) be deducted from this and the resultant figure halved, a fairly correct measurement of the transverse diameter of the brim is obtained. Much importance has been attributed to a diminution of the difference between these two diameters as indicating a flat pelvis. This is true for severe degrees of flattening, but in the great majority of slightly flattened pelvis there is no alteration whatever; in fact, the normal difference of 1 in. (2.5 cm.) may be increased.

The more important measurements are those of the true pelvis, and of these the external conjugate probably gives the most information. This should properly be measured from the depression below the tip of the last lumbar spine to the upper border of the symphysis. An error is often made in obtaining this diameter because the anterior limb of the pelvimeter is placed upon the anterior surface of the pubes instead of being carried well on to the upper border, so that the tip of the instrument is flush with the posterior surface of the symphysis, hence the diameter is usually made greater than it should be. It is

often stated that the external conjugate is unimportant because the amount of fat is variable, and the figure obtained therefore unreliable. But fat does not tend to a great extent to be collected over bony points like the vertebral spines, while the difficulty of excess of fat over the symphysis can be overcome by pressing in the pelvimeter more deeply. In normal pelvis this diameter is found to be remarkably constant at 7½ in. (18.25 cm.). In some cases, however, there is a variation, due not so much to fat as to a varying thickness of the mass of bone between the tip of the spine and the sacral promontory. That this is probably so is shown by the fact that a normally sized head will sometimes engage deeply in the brim of a pelvis whose external conjugate measures only 7 in. (17.5 cm.), or even 6½ in. (17.25 cm.). In these cases the contraction of the diameter is probably due to diminution in the thickness of the vertebra.

An external conjugate of 7½ in. (17.75 cm.) indicates scarcely any appreciable contraction of the true conjugate, and usually the engagement of the head is normal, but if it be diminished to 7 in. (17.5 cm.) it is frequently observed that the head remains higher than it should, and labour at term is unduly prolonged. In some of these patients there is definite non-engagement of the head followed by a protracted delivery. If the reading reaches only 6½ in. (17.25 cm.), almost certainly will there be found non-engagement of the head.

The posterior interspinous diameter, normally 4½ to 5 in. (11.25 to 12.5 cm.), should be measured from the two small depressions immediately external to the tips of the posterior superior spines, as this diameter almost exactly corresponds to the maximum width of the sacrum in the circle of the pelvic brim, which makes it a useful index of sacral development. Diminution in this diameter occurs in small degrees of generally contracted pelvis, because the sacrum is of a smaller model than normal, and also in the severer cases of flat pelvis because the sacrum is sunk more deeply between the iliac bones, thus allowing the posterior superior spines to become approximated by the inward pull of the sacro-iliac ligaments.

The external conjugate and the posterior interspinous diameters should be considered together when judging a pelvis. Small contraction of both will usually indicate a slight degree of general contraction, while a diminution of the former and the latter unaltered points to a small amount of flattening.

In the large number of pelvis undergoing routine examination it is comparatively seldom that the diagonal conjugate can be estimated owing to the inaccessibility of the promontory. No measurement of this diameter is trustworthy unless the finger can just pass the promontory, for, unless this can be done, one is never sure that the highest point is reached. Few fingers can reach more than 4½ in. (10.5 cm.). It is usual to subtract ½ in. (1.25 cm.) from the diagonal conjugate to obtain the true conjugate, but if the promontory be felt to project far forward, indicating a steep inclination of the brim to the horizontal, at least ¾ in. (2 cm.) should be deducted. In addition to an attempt to feel the promontory, the finger should be swept round the pelvic cavity to gain a rough idea of the size of the basin and the width of the subpubic angle.

But in spite of the most exact pelvimetry, slight degrees of contraction will often remain undetected unless the extent of the engagement of the fetal head is carefully examined. As Dr. Hubert Roberts says: "The best callipers is the baby's head." In the normal primigravida the head is usually deeply engaged in the brim, especially when near term, but sometimes it is high up. For this there may be obvious reasons, such as a full bladder and rectum, while pelvic contraction accounts for others, but there is a residue which do not admit of a ready explanation. When, however, the head can be pressed down into the brim, the pelvis is either normal, or, if contracted, the head has not yet reached such a size as to be incommoded by the diminished diameters. But if the head cannot easily be depressed by firm pressure this is usually due to contraction or to extension, the latter condition being easily diagnosed. The facility with which it is possible to press down the head is a most important clinical estimate, and should be observed with care.

It is usual to recognize three degrees of position of the head with reference to the brim—it may be *floating* (movable above the brim), *engaging* (movable in the brim),