may be recommended. This mixture, which must be shaken before spraying, proves very useful in all chronic catarrhal conditions of the throat.

Should there be nodules on the cords the mixture should be sprayed direct on to the cords daily, and the patient himself should be instructed to practise inhalation of K.P. and M.P. through a coarse spray from four to six times each day. If the nose alone is congested the solution may be employed plus drops of a mixture consisting of stovaine, carbolic acid, and ephedrine, 0.5 per cent. of each in paroleine. When there is tonsillar trouble a thorough washing with the alkaline solution mentioned should be given, followed by any antiseptic which is favoured.

Tonsil Operations

A word may be added about the undesirability of operations on the tonsils in the case of established artists. These people have taken years of study to obtain their form of voice production. In a large proportion of cases a tonsil operation will bring about some alteration of the voice, and when deterioration of the voice eventually occurs, as it does naturally, it is very likely that the surgeon's intervention will be blamed. The largest tonsils I have ever seen were those of a world-famous tenor and of a world-famous contralto. The time for tonsillar operation, if this is advisable, is during the early period of training before the tone production has been permanently set. Removal of the inferior turbinates should be avoided in singers. Enlarged inferior turbinates should be treated with the galvano-cautery. Deviated septa, save in exceptional cases, should remain untouched.

Finally, the laryngologist in this special field has occasionally to deal with a type of patient of whom specialists in other branches of medicine are generally free. Acute stage fright is not unknown in all classes and callings, but when the patient is a prima donna the case becomes formidable. It does sometimes happen that a lady of repute in the operatic world who wishes to create a sensation does so, not by singing but by refusing to sing. The disturbing announcement is usually telephoned to the Opera House on the morning of the performance. It has the highly satisfactory result for the lady that her name is written large in the evening papers, but for the management it is a matter of grave concern. Even if another prima donna be nearer than the next capital she has to be solicited to sing; she is naturally reluctant to take another's place when she has had no previous publicity, and the very idea of being a substitute may offend her *amour propre*. The public, too, have to be considered. They have paid to hear one particular lady, and they demand a return of their money. To put on another opera means great difficulties in engaging fresh artists and chorus and obtaining scenery which may be under some railway arch miles away. The delicacy of the task of the laryngologist who has to give an opinion on the lady in question will be readily appreciated, as well as his courage in facing her wrath should he pronounce her fit to fulfil her contract—but as her arias remain unsung perhaps the story is better unwritten.

The Duchess of Portland has issued an appeal for "the many old trained nurses who worked for very small salaries in the past, and whose tiny savings were used to help relatives or dwindled away as they themselves became old and ill. Not many people realize that there are hundreds of them living in great poverty in lonely rooms, without enough food and warmth." Gifts, large or small, should be sent to the Duchess of Portland, c/o The Nurses' Fund for Nurses, 95, Dean Street, W.1.

THE OBSTETRICAL SIGNIFICANCE OF PELVIC VARIATIONS*

A STUDY OF 450 PRIMIPAROUS WOMEN†

BY

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During the past decade the development of roentgenological methods for measuring the dimensions of the bony birth canal has brought about a revival of interest in pelvic architecture, particularly in its relation to childbirth. The present study of pelvic mensuration represents the findings in a series of 450 primiparous white women consecutively delivered at term (their children weighing 2,500 grammes or more) in the New Haven Hospital. The system of roentgen pelvimetry we have adopted is the so-called "grid method" (Thoms, 1933; 1935), which was developed in this clinic. In addition we have employed roentgenometry of the lateral aspect of the pelvis in many instances, and in the latter part of the series we have used a newly modified lateral technique as a routine (Thoms and Wilson, 1937). The observations extend over the past three years, and the group represents all the white primiparous women who during that time have been registered for pre-natal care prior to their delivery in the hospital.

Types of Pelvis

That the bony pelvis is subject to variations in contour is not a new concept. A half-century ago William Turner (1886; 1886a) emphasized the frequent occurrence of pelvic variations, particularly as related to the superior strait. This author divided pelvises into three groups—namely, dolichopellic, mesatipellic, and platypellic types—according to the pelvic index—that is,

$$\frac{\text{A.P. diameter} \times 100}{\text{Transverse diameter}}$$
 largely on that of Turner; however, we employ as a criterion the length of the antero-posterior diameter of the superior strait in its relation to the length of the transverse diameter. We suggest, therefore, that for clinical purposes there are four variations in which the majority of pelvises may be grouped for classification. These are:

1. Dolichopellic or anthropoid type.—The antero-posterior diameter is longer than the transverse.
2. Mesatipellic or round type.—The antero-posterior diameter is equal to or only slightly less than the transverse (the difference never more than 1 cm.).
3. Brachypellic or oval type.—The antero-posterior diameter is between 1 and 3 cm. shorter than the transverse.
4. Platypellic or flat type.—The antero-posterior diameter is excessively shorter than the transverse—3 cm. or more.

On the basis of the length of the antero-posterior diameter these first three groups (which more commonly occur) may be divided for purposes of clinical use into large, average, and small pelvises, as follows:

1. Dolichopellic type: A.P. diameter 14 cm. or more, large pelvis; between 12 and 14 cm., average pelvis; 12 cm. or less, small pelvis.

* Read in opening a discussion in the Section of Obstetrics and Gynaecology at the Annual Meeting of the British Medical Association, Belfast, 1937.

† This study was made possible through the Research Funds of Yale University School of Medicine.

2. Mesatipellic type: A.P. diameter 13 cm. or more, large pelvis; between 11 and 13 cm., average pelvis; 11 cm. or less, small pelvis.

3. Brachypellic type: A.P. diameter 12 cm. or more, large pelvis; between 10 and 12 cm., average pelvis; 10 cm. or less, small pelvis.

It is obvious that the above classification is chiefly useful in depicting the shape of the superior strait. In describing a given pelvis, therefore, it may be necessary to use additional terms—for example, such terms as "mesatipellic type with narrow forepart" or "dolichopellic type with funnel outlet."

In the present series, in addition to the roentgenometric procedures mentioned above we have employed external outlet pelvimetry as described by Williams (1931); vaginal touch in the determination, when possible, of the diagonal conjugate diameter; and the usual external measurements, interspinous, intercrystal, intertrochanteric, and external conjugate diameters. With regard to these latter measurements, as I have pointed out previously (Thoms, 1934), we find no useful correlation between them and the actual superior strait dimensions as revealed by roentgenometry.

Incidence of the Various Types

The incidence of the above types of pelvis in the series of 450 white women is given below.

	Large	Average	Small
Dolichopellic type occurred 70 times, or 15.5% ..	6	53	11
Mesatipellic " " 203 " " 45.1% ..	17	145	41
Brachypellic " " 156 " " 34.7% ..	27	110	19
Platypellic " " 21 " " 4.6% ..	—	—	—

It will be noted from the table that the mesatipellic or round type was definitely predominant. This is an interesting fact, inasmuch as in the past many authors have assumed that the brachypellic or oval type represented the normal female pelvis. The predominance of the mesatipellic type in previous similar studies has led me to believe that nature's pelvis is round and not oval, a fact which has been emphasized by Vaughan (1937) and discussed at length by myself in a recent article entitled "What is a Normal Pelvis?" (Thoms, 1934a).

Interesting also in this series is the incidence of outlet contraction as measured by the inter-tuberal distance. When this distance is 8 cm. or less such a pelvis is designated as funnel in type. The incidence is as follows:

Dolichopellic type	..	..	..	21 times, or 31.0%
Mesatipellic	"	"	"	38 " " 18.7%
Brachypellic	"	"	"	30 " " 19.2%
Platypellic	"	"	"	4 " " 19.0%

The increased incidence of the narrow outlet in the dolichopellic type is not unexpected, inasmuch as narrowing of the side walls of the entire pelvis appears to be characteristic of this group.

Incidence of Operative Intervention

In surveying the history of the labours certain facts seem to be of interest, and these will be briefly considered. The incidence of operative intervention is recorded as follows:

Dolichopellic type	..	..	..	11 times, or 15.7%
Mesatipellic	"	"	"	37 " " 18.2%
Brachypellic	"	"	"	31 " " 19.8%
Platypellic	"	"	"	7 " " 33.3%

These operations are divided thus:

Caesarean section	..	..	13	Mid-forceps operation	..	..	10
Version and extraction	..	..	3	Low or outlet forceps	..	..	60

The incidence of the low or outlet forceps, sixty times in 450 labours, deserves comment, because many of these patients might have delivered spontaneously if spontaneous birth were an object in itself. We believe, however, that in many instances where the second stage is prolonged primiparous patients may be more satisfactorily delivered by this means. Some authors have used the term "forceps control" for this indication, which is a descriptive term and should perhaps be adopted.

The Caesarean sections, thirteen in number, may be grouped according to pelvic type as follows:

Dolichopellic type	..	..	0 times, or 0% incidence
Mesatipellic type	..	..	1 " " 0.5% "
Brachypellic type	..	..	8 " " 5.1% "
Platypellic type	..	..	4 " " 19.0% "

Ten of the above operations were on patients with small pelvis in which the indication seemed to be obvious disproportion. In three there was no pelvic indication, and the operation was performed for: (1) pregnancy complicated by heart disease; (2) transverse presentation with early ruptured membranes; (3) borderline small pelvis in an elderly primipara (aged 45). The incidence of operative procedure in the series again seems to emphasize that the round or mesatipellic type pelvis is nature's pelvis, for spontaneous birth has a greatly increased incidence in this type.

Breech Presentation and Occipito-posterior Position

Breech presentation occurred in the series as follows:

Dolichopellic type	..	..	..	7 times, or 10%
Mesatipellic type	..	..	..	6 " " 2.9%
Brachypellic type	..	..	..	7 " " 4.4%
Platypellic type	..	..	..	0 " "

The relative increase of breech presentation in the dolichopellic type (10 per cent.) offers ground for interesting speculation, and whether this increase will be found in a larger group remains to be seen.

The occipito-posterior position was observed in the following cases:

Dolichopellic type	..	..	..	13 times, or 18.6%
Mesatipellic	"	"	"	22 " " 10.8%
Brachypellic	"	"	"	13 " " 8.2%
Platypellic	"	"	"	2 " " 9.5%

In our clinic pelvic examinations during labour are in general limited to rectal touch. It is probably true, therefore, that many cases of high posterior position which subsequently undergo spontaneous rotation to anterior position remain undetected. The above figures represent cases of posterior position of the occiput in which there was no doubt of their existence in the examiner's opinion. The comparatively high incidence of occurrence in the dolichopellic group I previously emphasized in 1933 in a paper entitled "A Type of Pelvis Intimately Associated with Occipito-posterior Position" (Thoms, 1933a).

Mortality Statistics

In this series there were no maternal deaths; six foetal deaths occurred, and these are summarized as follows:

1. 4,000 gramme stillborn macerated foetus; cause of death unknown (low forceps).

2. Stillbirth associated with hydrocephalus, spina bifida, club-feet (mid-forceps).

3. 3,500 gramme foetus; death intra partum of patient with severe pregnancy toxæmia (mid-forceps); small mesatipellic type.

4. 4,059 gramme foetus, stillborn after version extraction in small brachypellic type pelvis.

5. 3,145 gramme foetus; died two hours after mid-forceps operation in very obese patient with uterine inertia.

6. 3,510 gramme foetus, stillborn following breech extraction.

It seems reasonable to assume that the first two cases have little or no association with the type of pelvis or method of delivery, and as far as this study is concerned a corrected foetal mortality should exclude these, and is then 0.88 per cent. The gross foetal mortality for the series is 1.33 per cent.

Conclusions

It seems obvious from this and other studies that we should reconstruct our views with regard to the so-called normal female pelvis as it occurs in our adult white female population. This is evidenced by the fact that in this series the oval or brachypellic pelvis occurred in but 35 per cent. of cases. The classification here proposed seems to be of real practical value in our experience.

The chief value of exact pelvimetry by roentgen methods is undoubtedly manifest in cases of suspected disproportion. In this connexion the lateral roentgenometric technique referred to is of great importance. This is particularly true in those cases where at the beginning of labour the foetal head remains high at the superior strait and in which disproportion may be suspected.

In conducting labour in the dolichopellic type of pelvis it should be remembered that the longest diameter of the superior strait is antero-posterior and that this antero-posterior lengthening in most cases extends throughout the bony birth canal. This knowledge should therefore be useful in the treatment of cases of persistent posterior position and in directing the course of the aftercoming head in breech delivery.

Finally, with such simple roentgenometric methods at our disposal their routine use in primiparous patients seems justified and likely to be of great service.

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The annual international symposium organized by the Ligue Française contre le Rhumatisme will be held on October 9, under the presidency of Professor Laignel-Lavastine, and will be devoted to the subject of radio-active treatments in rheumatology. Physicians, radiologists, hydrologists, and surgeons who are interested in this subject are invited to attend. The papers will be published in the October issue of the *Revue du Rhumatisme* and sent to all the subscribers before the meeting. Reduced railway fare and free admission to the International Exhibition will be granted to members of the symposium. A detailed programme will be sent on application to Permanence de la Journée du Rhumatisme, 23, Rue du Cherche-midi, Paris VI^e.

TREATMENT OF TENNIS ELBOW *

BY

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"Tennis elbow" occurs mainly in tennis players, but occasionally in golfers, and more rarely in metal workers and amateur gardeners who use respectively the hammer and the trowel. There is practically never a history of injury—the pain comes on gradually during or after the favourite pastime. The most prominent symptom is pain on the outer side of the elbow when gripping, and this pain is usually much worse on gripping with the forearm pronated; indeed, the grip in the supine position is often painless. The pain may come on while grasping some trifling object like a tea-cup, which may even be dropped, but most characteristically it occurs only during indulgence in the favourite game. It may be merely a nuisance and noticed only on mishitting a back-hand shot, but in some cases the patient cannot even hold a racket. On examination there is nothing to see, but there is always a tender point, either exactly over the radio-humeral joint, on the epicondyle just above, or in the extensor group of forearm muscles. It may be difficult to locate the exact spot, but the patient can nearly always find it, and pressure on it will make him wince.

Physical Signs and Treatment

Of fifty-eight cases of which I have full notes the tender point was over the joint—front, back, or side—in thirty-two, the epicondyle in twelve, and somewhere in the muscles in fourteen; but the respective points are so close together that certainty as to the exact position is not always possible. As an example of this I would quote a case which I classified as of the muscular type and thought I could feel a bursa. At a subsequent operation the bursa was found to be a protrusion of synovial membrane from the radio-humeral joint. Clearly this should have been classified as the joint type. The only other physical sign is a slight limitation of extension at the elbow-joint, more evident and often only evident with the forearm pronated; this occurred in approximately two-thirds of my cases, and is, I believe, the essential indication for manipulation. It may be very slight and no more than a springy resistance to complete extension, which is not felt in the opposite limb. It may be so slight, in fact, that it can be overlooked. On two occasions I have noted no limitation of extension, but against my general rule have for some special reason tried manipulation. In each case I obtained further extension with a definite click, and in each case there was a quick cure. Any gross limitation of extension, such as could be measured with an arthrometer, would suggest a much more serious lesion than the condition we are considering. In cases which present this typical limitation of movement the tender point is usually over the radio-humeral joint (74 per cent.), less frequently over the epicondyle (26 per cent.), and never in the muscles themselves.

Cases with muscular tenderness are of an entirely different character. My practice has been to advise manipulation only in cases in which I found limitation of movement. The technique, which I described some years ago, is very simple. Under nitrous oxide anaesthesia

* Read in opening a discussion in the Section of Orthopaedics, including Treatment of Fractures, at the Annual Meeting of the British Medical Association, Belfast, 1937.