Case 24.—Single woman, aged 31. Had pain in right groin and hip, menorrhagia, and dysmenorrhoea. Operation at St. Mary's Hospital, March, 1922. *Result:* "Better." Now very seldom has abdominal pain; periods less; still dysmenorrhoea.

Case 25.—Married woman, aged 36; two children, youngest aged 3. Suffered from menorrhagia, leucorrhoea, dysmenorrhoea, and chronic abdominal pain. Operation at St. Mary's Hospital, February, 1924. *Result:* "Better." No menorrhagia, very slight leucorrhoea, slight dysmenorrhoea; still some aching in abdomen. Marked before operation as possibly suitable for ventro-suspension.

Case 26.—Married woman, aged 23; one child, aged 5 years. Suffered from chronic abdominal pain. Operation in July, 1923, at St. Mary's Hospital. *Result:* "Conditions perfect." No abdominal pain or menorrhagia.

Case 27.—Married woman, aged 40; two children, youngest aged 2 months. Operation in nursing home, March, 1921, on account of menorrhagia and chronic abdominal pain. *Result:* "Very much better for two years." No menorrhagia, abdominal pain less. Now has symptoms of climacteric.

Case 28.—Nullipara, aged 32; married nine years. Operation in nursing home, February, 1922, on account of dysmenorrhoea and leucorrhoea. *Result:* "Much better." Only occasional pain, no leucorrhoea. Pedunculate adenoma removed from uterine cavity by curette.

Case 29.—Married woman, aged 30; four children, youngest aged 18 months. Operation in nursing home, March, 1921, on account of menorrhagia and leucorrhoea. The result was not stated. Patient had to undergo another operation (details not given) in June, 1922. The only pain now is at the bottom of the back.

Case 30.—Woman, aged 24; married six months. Suffered from dysmenorrhoea and leucorrhoea, for which she underwent operation in a nursing home in December, 1920. *Result:* "No change." The reply refers to six months after operation. A pessary was then introduced, and pregnancy began six weeks later. Since then she has had one miscarriage and two confinements.

Case 31.—Married woman, aged 30; one child, aged 4½ years. Operation at St. Mary's Hospital in April, 1920, on account of menorrhagia, dysmenorrhoea, and leucorrhoea. *Result:* "No better." Still menorrhagia and leucorrhoea, not much dysmenorrhoea. Patient had another confinement two years after operation, and has been in bed for two months with "nervous prostration."

Case 32.—Nullipara, aged 19; married nine months. Was operated on for dysmenorrhoea, at St. Mary's Hospital in March, 1923. *Result:* "Unchanged." Still dysmenorrhoea and leucorrhoea. Patient was confined six months ago (March, 1924); she was pregnant three months after operation.

Case 33.—Woman, aged 30; married four months. Suffered from dysmenorrhoea, dyspareunia, and leucorrhoea, for which she underwent operation at St. Mary's Hospital in January, 1921. *Result:* "Unchanged." Still dysmenorrhoea and leucorrhoea. She was confined four months ago.

THE OPERATIVE TREATMENT OF KNEE FLEXION IN POLIOMYELITIS.*

BY

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I MUST apologize for bringing up a subject on which, to all intents and purposes, the last word has been spoken; but it so happens that within the last three years I have had fourteen cases under my care, in which the usual methods of continuous traction and wedge casts would appear to be insufficient, unless very protracted periods of time had been expended in such treatment.

With the limited number of hospital beds at my disposal and my very long waiting list, I felt that a quick method of deformity reduction was justifiable, and my experience has shown that such risks are negligible and that the deformity even in extreme cases is readily reduced within two or three days without circulatory interference. I may here add that, whatever vasomotor disturbances existed before operation, these were in no instance intensified. On looking up the standard works on orthopaedics I cannot find any definite instructions as to operative procedure: by one author we are advised to divide the hamstrings and by

another the tight structures, but as far as I can judge no standardized operation has been formulated.

At the Shropshire Orthopaedic Hospital I am told that at least an average of three months is required to straighten out bad cases, and even then subsequent operation may be required. It is obvious that all preventable deformities which follow poliomyelitis will become fewer and of less severity as orthopaedic after-care schemes become more general, but for the present I am afraid we shall meet with them from time to time.

In the cases under discussion three were bilateral and eleven unilateral; all displayed an extreme degree of paralysis, muscular power, if present, being represented solely by the ileo-psoas or the tensor fasciae femoris. None of the bilateral cases had attempted to walk since the onset of the disease, and two of the three cases had never walked. All the unilateral cases were "dangle legs," and walked either with two crutches or with one crutch on the affected side round which the withered and useless limb was crooked. Where the triple deformity of hip flexion, knee flexion, and talipes equino-varus existed, as in most of the cases, the knee condition was dealt with first; this was followed by a Soutter's operation where required, and finally reduction of the foot deformity with stabilization finished the operative sequence. The youngest case was 10 years old, with onset at a few months, and the oldest 41 years, with onset at the age of 7. Two other adults were over 35—one paralysed at 12 months, and another at 6 years. Twelve cases were of pure flexion; it is interesting to note that the degree of posterior tibial luxation is slight or absent in all paralytic cases unless one of the hamstrings escapes. Two cases had marked posterior luxation and external rotation of the tibia in consequence of the biceps alone retaining function.

The degree of flexion varied from 30 to 100 degrees, all measured during passive extension of the joint. The average deformity lay between 45 and 60 degrees. The longest paralytic history was thirty-six years; he had 100 degrees of flexion with marked luxation and external tibial rotation. In this case by open operation the deformity was very markedly reduced and I was able to perform an arthrodesis of the knee simultaneously without any undue removal of bone. This procedure, combined with foot stabilization, enabled him to walk very well with nothing but a surgical boot with 4 in. elevation. The shortest paralytic history was six years. In this case I am prepared to admit that with prolonged stretching an open operation might have been avoided, but where paralysis is so extensive that future tendon transplantation is out of the question, one is guided solely by the principle of surgical democracy. As is well known, forcible extension of a flexed knee by manipulation may be productive of a tibial luxation where this has not previously existed.

Operation.

The patient is turned on his face and a sandbag is placed beneath the lower third of the femur; an assistant holds the foot and steadies the limb, and produces extension of the knee when called upon to do so; no tourniquet is used. A vertical incision in the middle line of the posterior aspect of thigh and leg is carried from the mid-point of the thigh to the junction of the upper and middle thirds of the leg. The deep fascia is incised and is found to have undergone adaptive shortening, the skin is widely undercut, and a transverse incision is made through the fascia about the joint level. The muscles bounding the popliteal space are dissected from the large mass of fat which surrounds the popliteal vessels and nerves and which is found to extend down to the popliteal fascia and the popliteal surface of the femur. This mass of fat is very much more pronounced in these cases than in normal limbs. Where hamstring tendons are tight (11 cases) all should be divided, care being taken that the external popliteal nerve is freed from the inner surface of the biceps muscle at the point of section of the latter. The vessels and nerves are freed in the fat mass from the inner hamstrings and the inner head of the gastrocnemius; this can be done by sharp or blunt dissection, but I have found that the easiest method of separation is by means of gauze on the glove finger. Muscular branches to the inner head of the gastrocnemius and the superior and

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inferior internal articular arteries will require ligation. The inner head of the gastrocnemius is isolated, divided at its origin, and the muscle turned down. The fatty mass is then pushed to the outer side until the azygos vessels are seen perforating the joint capsule; these are divided between forceps and ligatured, and it is then found that by retraction and further dissection the entire mass, which includes vessels and nerves, is freed from the posterior aspect of the joint which is now in full view. In two cases there was no shortening of the hamstrings at all; in fact it was difficult to differentiate the muscles on account of the fatty degeneration, and section of the muscles was solely undertaken to get a better view of the ligament of Winslow. Transverse section of the capsule is accompanied by forcible extension of the leg by the assistant; it is found that no very definite extension is gained until the posterior ligament is fully divided from side to side; this section includes the short external lateral ligament and the tendon of the popliteus. I have not yet satisfied myself as to whether the popliteus is ever a deforming factor, as I have never seen the flexion deformity combined with internal rotation of the leg. The posterior articular surfaces of the femoral condyles now appear in the capsular wound, which becomes elliptical in shape as the result of extension of the leg. The posterior crucial ligament is now seen as a tight band which prevents full extension of the joint; on section of this ligament the limb easily extends, often by its own weight. It is sometimes necessary to dissect out the popliteal nerves from the fat mass to enable them to take a more superficial and direct course. The popliteal artery rarely appears tense, circulation in the foot generally returning within a few minutes. In only one case have we had to delay full extension for a day or two; here the last 20 degrees was obtained in this space of time by the use of gradual extension on a bed splint. The case is nursed for a fortnight in a bed splint, and when the sutures are removed the limb is encased in plaster; the hip and foot deformities are subsequently treated as has been stated. The shortening varies from 1 in. to 4 in., and the patient is taught to walk with a high boot and calliper. Passive movements of the knee are encouraged in all cases, so that in adults a jointed calliper can be substituted later. In one case manipulation under an anaesthetic was required to produce knee flexion beyond 60 degrees.

The operation is one of simplicity, and the only points that I wish to emphasize are:

(a) Section of the inner head of the gastrocnemius and the mobilization of the vessels and nerves to the outer side of the joint. The weakening of the gastrocnemius does not appear to have any detrimental effect later and no calcaneus deformity has arisen in connexion with foot stabilization.

(b) The division of the whole of the posterior ligament from side to side, and more particularly the importance of section of the posterior crucial ligament, which I regard as a prime deforming factor.

Table of Cases.

Case.	Initials.	Sex.	Age.	Limbs Affected and Duration.
1	G. H.	M.	10	Both legs useless from birth.
2	K. H.	F.	10	Both legs useless from birth.
3	J.	F.	35	Left; fifteen months.
4	F.	F.	24	Right; onset at age of 4 years.
5	H.	F.	36	Right; six years.
6	A. H.	M.	41	Right; onset at age of 7 years.
7	C. W.	M.	14	Right; two years.
8	E. J. M.	M.	12	Right; onset at age of 7 years.
9	H. W.	M.	12	Left; one year.
10	H. M.	M.	15	Right; onset at age of 3½ years.
11	G. M.	F.	14	Right; onset at age of 3 years. (In hospital.)
12	H. M.	F.	14	Both; never walked right. (In hospital.)
13	R. W.	F.	19	Right; onset at age of 2½ years. (In hospital.)
14	M. D.	F.	22	Left; onset at age of 15 months.

THE THEORETICAL FOOD REQUIREMENTS OF INFANTS.

BY

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THERE seems to be a great diversity of opinion regarding the food requirements of infants during the first year of life. This is probably due to the fact that during this period the infant can only give expression to its needs in a very inadequate manner. There can be no doubt that many infants are underfed, while others are greatly overfed. Overfeeding is, however, probably less common than underfeeding, because usually unmistakable signs of gastrointestinal disturbance are displayed before overfeeding has been persisted in for any length of time. With underfeeding, on the other hand, the signs are less striking and appear more gradually.

Most of the textbooks on pediatrics give instructions regarding the nature and composition of the food that should be given, but there is a very striking variation in the quantity recommended by different authors. For example, Still¹ advises that at 3 months of age an infant should be fed six times a day with a milk mixture containing milk 1½ oz., cream (48 per cent.) 1 drachm, and sugar 1 drachm, such a diet being equal to about 400 calories a day. Hutchison² would give a child of the same age

FIG. 1.—The basal metabolism of infants under 1 year per kilo of expected weight and degree of emaciation.

seven feeds consisting of milk 1½ oz. and sugar 1 drachm, equal to 300 calories a day; while Thomson³ recommends milk 4½ oz. seven times a day, equal to about 600 calories a day, and the figure suggested by Holt⁴ is 560 calories a day. Thus Hutchison would give a diet with only half the number of calories that Thomson suggests, while Still takes an intermediate position. Lusk⁵ justly says: "The so-called 'scientific feeding' of infants is unworthy of the name unless the caloric requirement is carefully considered. From lack of this knowledge babies are frequently systematically starved." For this reason and from the fact that there seem to be such divergent views on the subject, an attempt has been made, by utilizing the results of metabolic experiments, to indicate the ideal requirements of infants in various stages of malnutrition. Similar figures have been suggested by both Talbot¹¹ and Holt,⁶ but both these have confined themselves to the requirements of the normal infant, and although the total requirements suggested by Talbot agree fairly closely with those suggested in this paper there are considerable differences in the amounts allocated to the various processes the sum of which makes up the total requirements.

It has long been recognized that infants should be given quantities of food suitable for their age rather than for their actual weight¹⁰; in other words, they should be fed according to the weight they should be for their age (the expected weight) rather than according to their actual weight. Studies of the basal metabolism² have confirmed this view up to a certain point, for it has been shown that the basal metabolism of infants who are within 35 per cent. of the expected weight is as high as that of infants