time after injury. Any delay beyond twenty-four hours will entail failure in a certain proportion of the cases.

The results at present are particularly bad in cases in which gross comminution of the diaphyses is present. A primary excision or erosion of the joint (within twenty-four hours) would probably improve the results in such instances by preventing the development of entomylitis.

Repeated aspiration of the joint and the intra-articular injection of any of the antiseptics in common use are calculated to prejudice the natural defence.

It is safest to leave some drainage along the wound track after operation for a few days, certainly when bone injury is present. Any infection then left may become localized in the same way as occurs in the case of the peritoneum. A gauze wick makes a satisfactory form of drain.

Immobilization of the joint during all critical periods is essential. An interrupted plaster-of-Paris splint affords the best means of effecting this.

When general infection of the joint has taken place treatment by fixation, lateral arthrotomy, and immunization gives the best chance of saving the limb. Secondary abscesses are to be expected, and should be evacuated after their complete development. Neither cross section and flexion of the joint nor secondary excision of the knee are sound procedures.

I am indebted to Lieutenant-Colonel S. G. Butler, D.S.O., R.A.M.C., for permission to publish these notes and to Captain A. B. Le Mesurier, R.A.M.C., for much help in the treatment and recording of many of the cases.

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ON THE TREATMENT OF CERTAIN SELECTED CASES OF SEPTIC ARTHRITIS OF THE KNEE.

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THE septic knee-joint still presents one of the most difficult problems in surgery. Opinion has not crystallized as to the proper line of treatment. (1) Early "prophylactic" excision, and (2) amputation, have been strongly advocated, but in view of clinical experience the first method is not justifiable, whilst the second is a frank admission of failure to deal with the condition. It is not justifiable to do an early excision within twenty-four to forty-eight hours after the injury as a routine method of treatment, since experience at the base definitely shows that a certain proportion of cases recover after a localized suppuration within the joint, and even after a generalized infection with pus-formation.

Rest, fixation, lavage, antiseptic injections, serums, etc., all have their functions and scope within the first week or ten days after injury, and if they fail, then further treatment is required.

As regards amputation, it is admitted that in some very acute infections early amputation is the only hope of saving life. If a conservative line of treatment be pursued, and the joint kept rigidly fixed whilst local incisions, irrigations, etc., are used, then the best one can expect as to an end result, after many weeks or months, is a fibro-osseous union where one has no control over the amount of bone and fibrous tissue. All this time absorption is going on, the cartilages are eroding, the ligaments are being broken down, and the patient is at any moment liable to septic venous thrombosis with embolism, and few will escape without periarticular thigh and calf abscesses.

These complications are the inevitable result of lack of drainage in the presence of pyogenic organisms, and it is clear the whole problem of getting a case free from these complications is one of drainage. If one starts, then, from this basis, that the best one can offer such a case after a dangerous illness is a fibro-osseous union between the eroded bone ends and that the joint is almost inevitably lost, then the problem becomes simpler.

Delay in amputating, septic absorption, multiple septic emboli, were responsible for so many deaths in the early part of the war that it had become a working rule with many surgeons that the safest, quickest, cleanest method of dealing with a limb where the posterior pouches of the knee-joint are involved is amputation; thus life is saved at the expense of a limb with least bother to all concerned. Probably it is true this working rule holds good for the majority of cases, but, however perfect artificial limbs may be, and however cleverly used, it is difficult to believe that a stiff rigid leg, even a few inches short, where the hip and ankle-joints are normal is not infinitely superior and preferable to them; and though the cases are long and tedious and trying, yet the end result is worth having if the patient is satisfied and has a good useful limb in a few years. The problem, then, is: (1) To select suitable cases. (2) To drain completely at the earliest moment after one is satisfied that the joint is lost. (3) To get the sepsis overcome. (4) To get firm union of broad bony surfaces. It resolves itself, therefore, into doing an excision of the knee-joint in two stages in suitable cases.

The Suitable Case.

1. The patient must be young; certainly under 30 years, probably best not more than 25 years of age.
2. The favourable cases are lightly built men with small bones and without great muscular development. Fat and flabby cases are unsuitable.
3. The past history as regards general health must be good.
4. Courage and cheerfulness and a strong desire to keep the limb are most important factors. Querulousness and want of interest as to whether the leg stays on or not are contraindications.

The Local Damage must be Within Limits.

1. If the infection be an extremely virulent one then even immediate amputation may fail to save life, and no temporizing dare to be tried in this type of case.
2. If the bony damage is great, if the head of the tibia especially be shattered, then probably amputation is the best line of treatment. Further contraindications are (a) doubt as to the condition of the main nerves to the leg (the ankle action must be perfect to commence with, and be kept good all through the illness); (b) the presence of other serious gunshot wounds.

Taking these points into consideration, and offering unsuitable cases an early amputation as the best and surest treatment for their condition, there still remain many cases, boys with trivial injuries, where amputation seems a catastrophe, and for those cases one must try and get a better result.

It can be done. Time alone can settle whether it is worth doing, whether the end result is a comfortable limb or not. Certain it is that the patient is satisfied with the early result, and this more than anything else impels me to record experience and treatment of these cases.

The Joint is Lost.

1. From the clinical symptoms, the temperature, the pulse-rate, the nature of the discharge, and the general condition afford indications. Tenderness and oedema are sufficient guides; there is no need for definite periarticular abscess formation to prove that the joint is lost, and delay may mean danger of septicaemia and pyaemia, even after the joint has been laid open.

2. A pathological report on an examination of fluid withdrawn from the joint is a most valuable aid, but inasmuch as there is a percentage of cases which recover, even after the pathologist gives a grave prognosis, the clinical symptoms must remain the chief guide. The greatest value is as a stimulus against too great delay in operating in those cases in which the clinical symptoms lack definition and make one hesitate.

Procedure when Drainage is Necessary.

The septic knee-joint cannot be drained. When one considers the pouches, the ligaments, the spaces beneath the cartilages, this is obvious; therefore complete exposure of the surfaces which constitutes the joint must be obtained, and all abscesses which have resulted from leakage through synovial pouches must be freely opened.

This can be done by means of a Ω -shaped incision carried through the quadriceps tendon, by removal of the

semilunar cartilages, by section of the lateral and crucial ligaments so as to make it possible absolutely to dislocate the tibia from the femur and freely expose the posterior wall of the joint (Fig. 1).

FIG. 1.—Line of incision.

The pocket behind the external tuberosity of the head of the tibia is the guide to calf infection, and, usually, the upper and inner limit of the subcrureus pouch to the thigh periarticular infections. Calf abscesses are opened after getting a guide from a pair of forceps passed down the track from the knee. The thigh abscesses present no difficulty.

When this large surface is exposed one is satisfied that what was once a knee-joint is now a completely drained surface. Anything short of this is tinkering.

Experience has shown that the subsynovial tissue, probably as the result of lymphatic infection, tends to swell enormously, and therefore, as a point in technique, it is worth while spending a little time in excising the synovia, at any rate that of the subcrureus pouch.

Preference is given to the incision across the quadriceps tendon, as this allows of the patella being turned down, and gives better access to the pouch.

The patella is left in the meanwhile so as to keep the skin from shrinking, and a few incisions made into the prepatellar bursa help to keep that from becoming distended. No important structures are cut through in this procedure, very little blood is lost, and the operation is one which as a rule does not cause the patient much shock. It is, on the contrary, usually followed by immediate and great relief. Drainage being thus complete, if osteomyelitis and thrombosis have not already set in as the result of bad judgement and delay in operating, the case should naturally tend to settle down, if no further pocketing of pus be allowed.

The surfaces are kept apart by means of a special splint shown in Fig. 2. It was found that patients could lie for

FIG. 2.—Splint applied.

weeks quite comfortably in this position of abduction and rotation outwards of the thigh.

The apparatus was made of wood and perforated zinc, padded with gamgee tissue, but the idea of the splint is passed on to orthopaedic experts for improvement as the position is undoubtedly a good one for the treatment of such cases.

The "abscess" being now thoroughly laid open and the part put at rest it remains to overcome the surface sepsis.

This has not been found easy; cases did badly under "continuous irrigation," and the best results were got, up till lately, with alternated moist carbolic (1 in 40) and spirit dressings, changed once in twenty-four or forty-eight hours. More frequent changing is not practicable, as the dressing is too painful, and the first few dressings require an anaesthetic. After periods varying from three weeks to three months there results a fine clean granulating surface, and after the temperature has been normal for two to three weeks and the general condition of the

patient is obviously improved, one may proceed to the excision.

Whilst up till lately it has been clear that the progress towards an aseptic granulating surface has been more a result of the *vis medicatrix naturae* than the action of the antiseptics applied, it is almost certain that the Carrel method of treatment would be an immense improvement on that formerly used (there has not been an opportunity of making the trial yet), as, in addition to being a less painful dressing, it would hasten the time at which the second part of the operation could be done before contractures have been established.

The last two cases have at this stage been treated with Morison's B.I.P. paste. With perhaps one exception, no previous case has shown in the general and local improvement so rapid an overcoming of the septic process. These dressings did not require changing more than once in four to five days and have been the least painful of all to change, so that there are now at our disposal two greatly improved dressings for this stage, and one can promise the patient and oneself fewer and not very painful dressings and a much shorter period of waiting till the leg is straightened.

Excision.

The excision of the bone ends and the fixation of the limb on a splint which will allow the broad bony surfaces to lie in good apposition need no detailed description. One must cut one's coat to the cloth; provided that there is no rapid overstretching of the popliteal structures and no tension left in the space, then one has taken away sufficient bone without sacrificing any unnecessarily (Fig. 3). The guide is the circulation in the foot and

FIG. 3.—Folded layers of gamgee tissue to elevate heel and produce slight hyperextension at joint level.

toes, and proper attention must be paid to alignment of the middle line of the thigh and the tibial ridge, and an endeavour made to get just a shade of hyperextension. Each case is a separate effort requiring individual treatment, but these are the points to be kept before one.

There is always a certain amount of shock, and the patient's general condition must be good before the operation, but little blood need be lost if a flat tourniquet be used and if the leg be bandaged firmly into its splint before the tourniquet is removed. It is usually unnecessary to tie any bleeding vessels, but the bandaging must be firm over a good pad of gamgee tissue.

An average shortening of 2 to 2½ in. can be obtained even with cases where the excision has to be delayed for some months, but this can be improved on greatly if the Carrel and Morison methods fulfil their promise and one has no troublesome contractures of the soft parts to deal with.

The cases are therefore tedious and trying, and require much patient nursing. They should only be undertaken where there is a likelihood that the case can remain in the same hands till bony union has taken place. To pass such cases on at any earlier stage than this is not fair to any one.

The treatment is therefore one best suited for the base.

RESULTS.

Two cases were done in the summer of 1915. Both went to England with good bony union.

Twenty-seven cases were attempted from summer, 1916, to spring, 1917. Of these, 13 have been sent to England with good union, 3 are almost ready to proceed, 8 died, 3 were in the end amputated (all three lived and were transferred to England well).

Of the cases which died, one was a fulminating case and died in forty-eight hours after admission, one died of

perforating gastric ulcer, 2 died of complicating chest conditions (these four cases should not have been attempted), 4 cases died of pyaemia—the result of hesitation and delay in doing the first part of the operation.

Most of these cases were undertaken during the great rush when all the staff were working under great pressure, and the results must be judged accordingly.

Viewing the matter in the light of the experience gained and the conclusions drawn in this paper, I do not see why the mortality after this operation in selected cases should surpass that of amputation as a routine treatment, and some of the results obtained seemed so excellent that the procedure deserves further trial.

The average duration in hospital before complete drainage was ten days. The average period before excision was sixty days. Six weeks after that most of the cases were ready to go to England. The average stay in hospital was thus about four months.

I desire to express my thanks to Lieut.-Colonel E. C. Hayes, R.A.M.C., for permission to publish these notes, and for his encouragement; to Captain Lazarus-Barlow, R.A.M.C., for his valued co-operation in the examination of the fluids taken from the joints; and above all to the nursing staff, the theatre sisters, and the colleagues associated with me in the treatment and care of these cases.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

THE DETECTION OF DEAFNESS.

In the JOURNAL of August 25th, p. 252, I see a suggestion by Dr. Eyre as to the detection of deafness, which I must frankly say I do not understand. Is it intended to convey that because a man hears words whispered six or eight inches from his better ear that he is therefore not "hard of hearing"? If this be not implied, what is the point of the memorandum?

The question as to the detection of deafness is by no means simple, even for the expert. Roughly, the class of cases in which malingering may be suspected falls under three categories:

1. Simulation of one-sided deafness.
2. Exaggeration of deafness which is actually present.
3. Simulation of complete deafness.

As the various methods employed for the detection of simulation are discussed in textbooks, I shall merely refer to those which seem to me most useful. Where the patient states that one ear is quite deaf, this may be verified or the reverse by connecting his ears with the mouths of two observers by means of speaking tubes. Each whispers words into his mouthpiece, and the malingerer will probably soon give himself away by repeating those spoken into the deaf ear. The same result may be attained by the employment of a binaural stethoscope with one limb occluded.

Exaggeration of deafness which is actually present is much more difficult to discover, and even the expert will find such cases difficult. Repeated tests, used at intervals, together with weighing the objective appearances and data derived from the history and comparing them with previous experience, afford the best prospect of success.

These, however, will not assist us very much where complete bilateral deafness is simulated. It has been suggested to try the effect of a loud voice to waken the patient from sleep, while it has also been proposed to employ anaesthetics, but the latter requires the assent of the patient. In such instances I see no method available excepting that of espionage, and if possible inquiry directed to those who have known the patient.

It is, of course, very important that injustice should be excluded, and for this reason it is desirable to impress upon those who examine that the tests employed should not be liable to fallacy.

In examining soldiers it will often be found that an inaccurate statement is made from carelessness, but without any intention to deceive. Thus, if the tuning-fork be applied to the middle line of the head, we shall often be told that the fork is perceived only in the better hearing

ear, even if the deafness be not due to involvement of the nerve apparatus. Again, we shall be told that if the good ear be closed the fork is no longer heard. I have seen this so frequently among men who obviously had no desire to impose upon me that I have ceased to attach any value to the phenomenon.

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RUPTURE OF UTERUS: RECOVERY.

ALTHOUGH annular rupture of the uterus in the neighbourhood of the cervico-vaginal attachment is sufficiently common to be described in the larger textbooks, the following case presents unusual features which make it worth placing on record:

I was called to the patient late in the evening of April 3rd by a midwife on account of prolonged labour. The os was fully dilated, the membranes unruptured, and the head and umbilical cord presenting.

On rupturing the membranes the cord immediately prolapsed outside the vulva; no pulsation was to be felt. The head was above the brim of the pelvis, which was flattened in its antero-posterior diameter. I performed internal version without difficulty, but was unable to extract the after-coming head; in endeavouring to extract, I caused a fracture of the cervical vertebrae and pulled away the body of the child, leaving the head behind and tearing through the cord in the process. The head being well pressed down by the midwife, I then perforated and extracted with difficulty with a cranioclast.

On examining again after delivery of the head I found an annular rupture of the uterus extending completely round the cervico-vaginal attachment except for a thin pedicle by which the uterus was still attached posteriorly; the placenta had escaped into the abdominal cavity. I seized the uterus with a pair of craniotomy forceps, placing one blade in the cavity and the other outside, and dragged it down through the vagina; the remaining attachment I ligatured as high up as possible, and so completed the separation of the uterus.

The pulse by this time was very bad, but there were no signs of haemorrhage, and, the nearest hospital being fourteen miles away, I decided to adopt an expectant attitude, and in the meanwhile applied restoratives.

On the following day the pulse was stronger, rate 132, and I considered her fit to stand laparotomy. Mr. Washbourn, of Gloucester, saw her with me in the afternoon, and opened the abdomen in the middle line below the umbilicus. A moderate amount of blood clot was removed from the pelvis, but there was no recent haemorrhage; the placenta was found in the neighbourhood of the splenic flexure; the abdomen was quickly closed with the exception of a gauze drain into the pelvis.

A week later, the discharge through the wound having become purulent, I sent her into Gloucester Infirmary, where she was treated by douches, etc., and discharged five weeks later with the wound closed.

The patient had been married four years, and had had two previous pregnancies; the first terminated in the expulsion of a stillborn fetus (described by the midwife as "macerated") at the eighth month; the second in a miscarriage at the seventh week. The uterus was normal to the naked eye, and it was impossible to determine where the rupture had commenced.

I am indebted to the courtesy of Mr. Washbourn in publishing the later part of this case.

Cinderford. GEORGE F. RIGDEN, M.B., B.S.Lond.

A HUGE MESENTERIC CYST IN A YOUNG MARRIED WOMAN.

MESENTERIC cysts are extremely rare things. The subject of the instance here reported is a young married woman, aged 25. She had never been pregnant, and menstruation had been recurring regularly, although during the last eighteen months the periodic loss had been increased somewhat. She had never experienced pain in connexion with menstruation. Five weeks before coming under my care she began to experience some difficulty in fastening her corsets, and this increased so rapidly that during the last three weeks she had to dispense with them altogether; this increase in size was her sole trouble. On cross-questioning, she stated that her "stomach" had always, as long as she could remember, been rather big.

I found the abdomen very prominent; it was occupied by a swelling which extended from the pelvis to 5 in. above the umbilicus. The percussion note over the tumour was everywhere dull. The right flank was resonant; the left was dull; fluctuation was readily elicited. By vaginal examination I found the cervix located anteriorly towards the right side. I could not differentiate