Remarks

ON

THE TREATMENT OF THE WOUNDED KNEE-JOINT.

MADE AT THE OPENING OF A DISCUSSION AT ROUEN,

BY COLONEL H. G. BARLING, C.B., A.M.S.

If any apology is needed for discussing wounds of the knee-joint it will be found in the number of such cases occurring during the war, and in the deaths, the amputations, the loss of function in the joints resulting therefrom, which have been and still are a matter of constant anxiety to us all.

If we had attained the acme of success, or if we were agreed on the lines of treatment to be adopted, the discussion to-day would be unnecessary. But neither of these conditions can be claimed; success such as we desire is still far from us, and whilst there is agreement as to treatment up to a certain point, then comes divergence.

I have no cut and dried programme of treatment to place before you, for although I have seen and treated a considerable number of infected knee-joints in military hospitals at home I recognize that the problem of treating such cases out here is a different one, and I have only had a brief experience in France.

I will in the first instance give figures showing the general results of treatment in the Rouen area during the months June to December, 1916. No one is better aware than I am of the objections which may be offered to the study of surgical conditions by statistical methods, nor am I forgetful of the fact that classification such as I have adopted is necessarily in some degree artificial. Recognizing these limitations I still believe that something may be learnt from the figures, and I should like here to express to the commanding officers and to the surgical specialists of the various hospitals my best thanks for the trouble they have taken in searching out the notes of cases over a prolonged period, practically from July 1st to December 31st, 1916, though in some instances a rather longer period is covered.

The figures from all hospitals are added together, so that we obtain the average results. Each hospital will be able to compare its results with the average, and will learn whether its amputation rate and its rate of mortality is as good as or worse than its neighbour's. From my own experience I know that it is a healthy discipline occasionally to get out the figures of one's work in some particular line; general impressions are not always reliable, figures may supply a useful corrective.

Before considering the statistics it is necessary to remember that from them are excluded—

(a) All cases in which owing to the healthy appearance of the wound and the quietude of the joint no operative measures were resorted to; and

(b) Those cases in which conservative measures were impossible and early amputation was imperative.

One other point should also be remembered—it is that circumstances entirely prevent any record now of the final condition of the patients comprised in my table.

The first thing that strikes one in the figures is the very high proportion of cases in which excision of the wound, removal of bone when necessary, removal of any retained foreign body, irrigation of the joint and closure by suture has been followed by a perfectly satisfactory healing without further interference. The proportion of these cases requiring further intervention is 25.5 per cent., and it is, I think, reasonable to believe that free use of the joint is likely to result in a large majority of those in whom the primary operation was successful. (See table, items 4 and 5.) In the next group, where complete closure was not possible or was deemed inadvisable, and in which the wound was packed, we have not such a good account. The results, though, are still very good, especially when we remember that this group pretty certainly includes the worst cases of injury to the bones entering the knee-joint. Here the proportion of cases in which further operative interference was required is 38.4 per cent. (See table, items 6 and 7.) Although again we have no definite figures to guide us, I am satisfied from my experience of such joints in the past that very useful joint

function may result in many cases; this is confirmed by reply cards returned by patients to the surgeons out here who have operated upon them.

I think we shall agree that excision of the wound, removal of bone when required, removal of foreign body, suture of the wound, if possible, and packing as an alternative in selected cases, is the programme to be followed.

In the reports which have been kindly sent to me on methods adopted I find some divergence on details—one surgeon washes out the joint with one antiseptic, one with another, but the majority seem to favour eusol. In a considerable number of instances materials such as formalin and glycerin or ether have been injected and retained in the joint cavity. A few surgeons pack the joint with urea and speak favourably of the results obtained. One operator makes a point that may be worthy of attention; for the purpose of washing out the joint he makes a separate incision at some distance from the wound of entry, thus securing that at all events he drives nothing septic into the joint.

I question whether it much matters what fluid is used to wash out the joint, the main advantage is the mechanical cleaning out of septic material, fibrin and blood clot, but this should be thoroughly done, and I question if it is thoroughly effected unless there is a free opening; the use of cannulae for this purpose seems to me insufficient. Any antiseptic now at our disposal capable of destroying the infection is capable also of damaging the endothelium of the joint and so of reducing the resistance of the tissues to infection. On one point I am sure we shall all agree—it is the immense importance of carrying out with the most scrupulous care and technique the primary operative interference.

I turn now to another vital question we have to consider in connexion with the wounded knee-joint. I have already shown what a considerable proportion of cases settle down after the primary operative measures. When this does not happen and the joint is swollen and painful, the temperature and pulse are rising, evidences that the infection has not been overcome by the early treatment, what are we to do? Are we to be content with aspiration of the joint and irrigation or injection with an antiseptic fluid? Personally, I would deprecate this line of treatment and would only resort to it if the fluid showed only a low corpuscular element, a moderate polymorph count, and a sparsity of infective organisms—conditions which will rarely be found. Mere aspiration is apt to be followed by a breaking of infection through the capsule of the joint and a spread into the surrounding tissues, a grave addition to the patient's troubles most difficult to overcome.

Regarding aspiration as rarely a wise measure, I mention three other courses open to us: (1) Free opening up of the joint; (2) excision of the joint; and (3) amputation. Of arthrectomy I say nothing, partly because I have seen little of cases treated by this method and partly because it does not commend itself to my judgement.

I. Free Opening of the Joint.

By free opening of the joint I mean a lateral incision on each side to the extreme limits of the great bursal pouch and well to its lateral margins. Some surgeons go further, and in order to empty the posterior portion of the joint divide the lateral ligaments right back to the posterior margins of the femoral condyles. If ankylosis results the division of the lateral ligaments does not matter, but if some mobility is retained there is left a certain want of stability in the limb which somewhat interferes with its usefulness. For this reason I would reserve division of the lateral ligaments until a later stage of ill-doing in the septic joint showed that it is really called for, and especially would I resort to it when drainage of the posterior part of the joint is required. With free opening of the joint I would associate treatment by Carrel's method. The introduction of, say, four of his tubes, with the instillation of Dakin's fluid on the usual plan, gives greater promise of successfully combating septic joints than any other measures I have seen used. It does not seem necessary or desirable to retain the tubes for an indefinite time inside the synovial sac; in a few days, if possible, they should be so arranged as to lie outside the joint cavity. This will not relieve us of the duty of constantly watching the patient for any fresh focus of infection, especially at the postero-lateral aspects of the joint. Whatever the method of treatment adopted

its success will in the end depend upon the constant watchfulness and personal care of the surgeon, which is, of course, a hard saying when there is great pressure on the hospital staff.

II. Excision of the Joint.

This operation has not been much in favour at the hospitals in Rouen; at some it has not been resorted to at all, but I have collected forty-two cases. Of these, eight were followed by amputation, and the deaths, either with or without amputation, were thirteen. I do not regard this as a fair picture of what may be obtained by excision. In some cases I am satisfied that excision was resorted to at too late a stage, in the hope of escaping from the disagreeable alternative of amputation—a hope which was frustrated later on, amputation then being performed in patients who were ill able to withstand a further severe traumatism. If we are to consider excision at all it must not be as an alternative to amputation; there is a case to excise and there is a case to amputate, and these must not be confused. One of the really difficult tasks which a surgeon has to undertake if he adopts excision is to select suitable cases.

Some of the results recently reported of early excision tempt one to adopt that line of treatment, but it will be well to remember before doing so what our own experience has taught us, that a large number of such early cases recover under conservative treatment, and with useful joint function in some instances. Another point which makes one hesitate is the lack of knowledge of the final utility of the excised limb. One method suggested in a recent paper involved a wide separation of the divided bones of about two inches, and the bone ends being maintained apart until all sepsis had disappeared. From the experience of excision of the knee in civil practice failure of bony union is under these conditions likely to occur; and the union by fibrous tissue may be very unstable. Firm union after excision has always appeared to me to depend mainly on early and accurate approximation of the sectioned bones. If bony union fails, further operative measures, by freshening of bony surfaces or by bone grafting, may yet succeed, but even if they do they involve for the patient the anxiety of a further operation, a rather prolonged convalescence, and possibly further shortening of an already short limb. Conviction as to the value of excision of the knee will only arrive when we know the final results obtained. To sum up this question of excision, if we excise very early we may get immediate satisfactory results, but we do not know what the final results will be, and we shall be excising joints which in a considerable number of cases may recover under conservative treatment, some with useful movement. If we excise in a later period we encounter a considerable death-rate, a high amputation rate, and uncertainty as to the final utility of the limb in the remaining cases.

III. Amputation.

The third course available when the primary conservative operation fails is amputation. I have heard amputation deliberately advocated as the correct immediate treatment if there is good proof that the sepsis has not been controlled by the primary intervention, mainly on the ground that our chief business is the saving of the patient's life, and that early amputation would be attended by a very low rate of mortality.

No one would dispute that early amputation would have a low death-rate, but such a course is repugnant to the patient and to the surgeon, and many limbs would be sacrificed which are now saved. Even though the knee be ankylosed or the limb shortened considerably, there is no comparison between the disability of the man with an artificial leg and that of one who retains his own, rigid though it be. For the sake of the individual whose earning capacity and whose enjoyment of the amenities of life will be seriously diminished, as well as for the sake of the State, we must spare the limb when we dare. But the onus falls on us of deciding in each individual case that we have pursued conservatism as far as is reasonably safe. All the convictions as to the advantage of a damaged limb over an artificial one, all the sentiment which makes amputation so repugnant must be kept firmly in hand. It is a sad epitaph for any patient that his surgeon, out of too kind consideration, deferred amputation until it was

too late to save the patient's life. If we are perfectly frank with ourselves, few of us will be able to say that we have not erred in this direction. Reference to the figures will show that amputation followed in 13 cases after failure of excision or arthrectomy, and in 151 other cases not so treated; the total number of amputations was 164, or 19.4 per cent. The percentage of amputations has varied considerably at the different hospitals. The total mortality from all cases has been 72; the percentage is 8.5.

1. Total cases of injury to knee operated on	845
2. With bone injury	438
3. Without bone injury	407
4. Wound excised and closed	322
5. Cases under (4) requiring further operation	82=25.5 %
6. Wound excised and packed	336
7. Cases under (6) requiring further operation	128=38.4 %
8. Excision of knee	42
9. Arthrectomy, partial or complete	15
10. Excisions or arthrectomies amputated	13=22.8 %
11. Deaths after excision or arthrectomy	13=22.8 %
12. Amputation without excision	151
13. Deaths under class 12	49=32.4 %
14. Total amputations	164=19.4 %
15. Total mortality	72= 8.5 %

NOTE.—One hospital with a large number of cases was unable to separate the cases under items 4 and 6.

EARLY TREATMENT OF GUNSHOT WOUNDS OF THE KNEE-JOINT.*

BY

TEMPORARY COLONEL H. M. W. GRAY, C.B., A.M.S.

THE splendid results which many of you are achieving make one wish that all knee cases requiring operation could be treated in casualty clearing stations, but during a push this is out of the question, so that a selection must be made of all cases likely to be able to travel to the base without serious risk.

Before going further, I desire to say that in no other class of cases is technique and judgement in early treatment reflected so much in the results obtained. The surgeon who exhibits the greatest care in technique, especially when removing foreign bodies and infected tissue, whether of the soft parts or of the bone, gets the best results. So good are these that, recently, several cases which, in the earlier part of the war, would have been submitted to primary amputation, on account of the extent of the damage to bone, have been sent down the line with every likelihood of having not only a useful limb, but a useful movable joint also. Conservative operations on gunshot wounds of the knee-joint, however, in order to be successful, demand such care that I think they should be handed unreservedly to the surgeon in the unit who has demonstrated special skill in their performance. I venture to lay special stress on this, because many really good surgeons fail to appreciate even what is essential in totally excising the soiled wound in such cases. To this cause I attribute most of the failures.

All wounds of the knee-joint should be splinted by the field ambulance units. This is most important, because movement may aggravate infection already present, or introduce infection where none existed, and in both ways prevent successful conservative treatment.

Excision of Wound.

The ultimate object of treatment of these cases is to secure mobility of the joint. Our primary object in the casualty clearing station must, therefore, be to secure asepsis. The surest and quickest way of doing this is to excise completely, if possible *en masse*, all tissue which is definitely or probably infected. This having been done, the wound remaining can be treated on aseptic principles. This, of course, entails the exclusion of all instruments, gloves, towels, etc., which may have come in contact with infected parts. A large percentage of these wounds are sutured, and heal by first intention. A suitable plastic operation may have to be done. In most cases it is advisable to provide drainage "down to but not into" the joint cavity or bone fragments.

* Paper read at a meeting of medical officers of an army in the field.