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PRELIMINARY EXPERIENCE WITH SMITH-PETERSEN'S HIP CUP ARTHROPLASTY[1]

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At a time when the choice between the different methods of arthroplasty of the hip joint has gained renewed actuality, even a small hip cup material with a relatively short period of observation is of some interest, especially when the material has been judged by the same criteria (vide *S. Kiær* p. 127) as a simultaneous material of resection with acrylic prosthesis replacement, done in a parallel department of the same hospital.

More than 500 hips have been operated upon by *Smith-Petersen* since 1938 by the hip cup method. The impression gained from his own publications is that the results are good in 80 per cent of the cases. 10–15 per cent of these, however, were re-operated on because of exostoses around the cup.

In other series the percentage of satisfactory results varies between about 50 and about 80 per cent, while isolated writers on the basis of small materials, completely disown the cup interposition procedure.

AUTHOR'S MATERIAL

In Department I of the Orthopaedic Hospital, Copenhagen, we had until April the 1st, 1951 operated upon 37 hips in 36 patients, using the cup method. All our cases were osteoarthritis, 7 of these cases being unilateral, 29 bilateral.

In the unilateral cases the causes of osteoarthritis were:

tuberculosis of the hip	2,
subluxation of the hip	2,
slipped epiphysis of the neck	1,
fracture of the femoral neck	1,
traumatic dislocation	1.

[1] Paper read before the Danish Orthopaedic Society on April 14th, 1951.

Of the bilateral cases 11 were secondary to

congenital dislocation	3,
congenital subluxation	4,
traumatic dislocation	1 case,
rheumatoid arthritis	3 cases.

One patient had an active rheumatoid arthritis, another an active gonococcus infection with a persisting positive complement fixation test. Of those remaining 8 had demonstrable or symptom-causing osteo-arthritis in one or both knees, and 2 had spondylosis deformans.

The *operative indication* was in all cases pain and difficulty of walking. In one case with ankylosis on one side and adductor spasm on the other the main indication was sexual difficulties.

RESULTS

Of the thirty-seven cup arthroplasties six have been done within the last four months before the follow-up and cannot yet be judged. The remaining thirty-one cases fall in four nearly equal groups:

I. Observation time 2–3 years[1]: 8 cases	excellent	3	
	good	1	50 %
	fair	2	50 %
	bad	2	
II. Observation time 1½–2 years: 7 cases	excellent	0	
	good	4	57 %
	fair	1	43 %
	bad	2	
III. Observation time 1–1½ years: 8 cases	excellent	3	
	good	1	50 %
	fair	4	50 %
	bad	0	
IV. Observation time 4–12 months: 8 cases	excellent	1	
	good	3	50 %
	fair	4	50 %
	bad	0	

[1] A further 7 Smith-Petersen arthroplasties were performed by one of the authors in 1948–49 with *Rovsing*'s instruments dating from 1916, which are an accurate copy of *Murphy*'s original ones. The results are just in line with the other groups. Of 6 followed up 2 are excellent, 1 good, 2 fair and 1 bad.

The results have been judged by *Merle* d'*Aubigné*'s mark system. This system renders, in our opinion, a good numerical measures of the pre- and postoperative condition of the hip joint. In particular it yields the possibility of analyzing even so small a material as ours more thoroughly.

A good result according to Merle d'Aubigné's method is, however, considering the magnitude of the operation and the long period of convalescence, not sufficiently good for the surgeon and patient to declare themselves satisfied. We have therefore in the above figures drawn a line separating the patients who have really benefited from those who have not been helped. This line is in all groups at about 50 %. No progressing improvement or worsening of the final result is seen inside the observation period. This axiom cannot, however, be used in the isolated cases, as some do improve on account of better walking, while others deteriorate because of exostosis formation around the hip cup with ensuing smaller range of movements.

There was no *operative mortality.*

Complications were few. Superficial thrombophlebitis occurred in one patient, deep thrombosis in five, two of which had pulmonary embolism. Wound infection was seen in two patients, in the one patient in the soft parts only, in the other the joint was involved and this compelled us to remove the vitallium cup at a secondary operation. Formation of osteophytes around the acetabuloplasty, from the trochanter or from the femoral neck was observed at the follow-up in seventeen cases. In nine cases small, scarcely symptom-causing proliferations were demonstrated; in four the cup seemed fixed and movements took place between the cup and the femoral head alone. In two cases a complete bridge had formed causing bony ankylosis. The whole condition had improved (less pain, better walking and working ability) in these two cases. Nevertheless these patients are listed among our bad cases, as even a perfect ankylosis cannot be a good result of an arthroplasty.

A satisfactory result in 50 % of the cases is too little even when you take into account the fact that patients with multiarticular osteoarthrosis have always been the enfant terrible of orthopaedic treatment. The possibility of improving the results of surgical treatment of osteoarthritis of the hip must either be sought in altered method, improved technique, or altered indications. Concerning the first two points we are carefully considering the results of others. As to the last point, the indications, we have analysed our material for possible information in spite of its smallness.

It turns out that of twenty-one cases with starting marks less than 10, the average increase in marks was 8.1, i.e. a good result. On the other hand in the ten cases with starting marks of 10 or values below that figure, the average

increase was 2.8, and all the four cases listed as bad in the above table were among them. Only one result was excellent and one fair.

We are able to conclude, that the method does not seem warranted in less serious cases, and nothing is gained by widening the operative indications in this direction, on the contrary. Even from these small figures it seems to be a justifiable conclusion that you should refrain from offering a cup arthroplasty to patients whose marks according to *Merle d'Aubigné* are calculated to 10 or more and reserve the operation for the serious cases.

If you analyse the three cardinal symptoms (pain, walking trouble, and decreased movement) one by one, it turns out that it is principally the pain that is relieved by the cup arthroplasty.

The preoperative pain status according to *Merle d'Aubigné* had an average of 2.4, the postoperative status being 5.0, i.e. an improvement averaging 2.6, which by calculating the result according to *Merle d'Aubigné*'s method is doubled to 5.2 profit marks. Only in three cases was the pain status unaltered.

In a total number of nine cases the patients complained of considerable pains postoperatively, corresponding to grade 4 in the table or more. In seven of these the pains were located in the lower part of the femur, either in front or deep on the lateral side.

We have seen a procain block of the lateral cutaneous nerve help in these cases and we are therefore inclined to consider the pains and myoses in these regions to be caused by referred pain through the lateral cutaneous femoral nerve, which may easily be compressed in the cicatrix by *Smith-Petersen*'s incision. We have therefore started to remove this nerve inside and outside the pelvis for about 10–15 cm and believe we shall improve our future results by this procedure.

The results as to walking are not good. Only 4 patients have obtained a real improvement in walking (2 points' gain), 11 walk a little better (1 point), 10 are unchanged and 6 are worse.

A definite Trendelenburg's sign has been found in four patients; in nine the test was inconclusive, but probably negative, and in four there were pains when stepping with full weight-bearing on the operated leg. This last circumstance we cannot explain, and we could find no relation between this and a deeper, or a more superficial position of the cup.

The number of patients with a positive Trendelenburg's sign is not considerable, but the many inconclusive results of the test show a moderate loss of power in the gluteal muscles, and this fact should make us show the greatest care in suturing the abdominal muscles to the gluteal muscles across the chiseled-off iliac crest. In this direction we believe we have not shown neglect. On the other hand it is possible, that we should have been more active with the postoperative exercises, and the roller-skating exercises should probably be supplemented with abduction exercises in the lateral position.

It was to be expected that the results as to walking would improve with time from group to group. This is not the case. The average values were found somewhat above the collective average of the youngest group under 1 year. This fact together with the strange anxiety to walk with full weight-bearing which a lot of the patients show, is possibly in favour of teaching these patients to walk on their new hip earlier without support. Having walked for a long time with crutches or supported by sticks it is not easy to learn to walk without a support.

The results as to *movements* are difficult to judge, if a gain in abduction is coupled with a loss of flexion, and that is a common happening in our material.

In all we have had a real gain in movements in sixteen cases, a loss in eight, and status quo in seven.

The reason that the collective results are not a lot better than the average 0.7 points is, as mentioned above, the loss of flexion. The rectus femoris is temporarily detached at its origin and later sutured to the inferior iliac spine through a hole drilled in the bone. At the follow-up we found a much reduced rectus function in four cases and a slightly reduced function in about half the cases. From this finding we have learnt that the preservation of the rectus femoris function must remain one of our foremost tasks in future cup arthroplasties. *Smith-Petersen* visualizes the nerve to the rectus. We have not done this systematically, but we have always kept at a safe distance above the nerve. It can, however, be compressed by a retractor and in the future we intend to dissect the nerve free. We do not think the suture of the rectus can be done more solidly than we do it at present, but we will take more pains to exercise the rectus in the after-treatment.

SUMMARY AND CONCLUSIONS

If we are to *summarize* what we have learnt from this follow-up:

With Smith-Petersen's hip cup-arthroplasty for osteoarthritis of the hip we have been able to help 50 % of our patients, 40 % are unchanged, while 10 % are worse. The best materials up to now have gained 70–80 per cent with the operation.

Even with unaltered indications the results show that improvement may be reached by

1) systematic extirpation of the lateral cutaneous femoral nerve, as a considerable number of patients complain of referred pain in this nerve's region.

2) By systematic postoperative training of the gluteal muscles and the rectus femoris, as insufficient power of these muscles is the main reason for insufficient stability, walking trouble and lack of flexion power.

3) By visualization of the nerve to the rectus femoris, as the impaired rectus function may be caused by lesion or traction on the nerve.

The formation of osteophytes after the operation, especially around the acetabuloplasty, is the draw-back of the operation both in our hands and others. We have not been so eager as *Smith-Petersen* to do a secondary chiseling of these, as we have thought that fresh exostosis formation and fixation of the cup would ensue. It is possible that we ought to change our outlook, and the removal of exostoses need not be a major procedure. We do not know how to prevent these osteophytes from forming. At any rate electrocoagulation of this new acetabular rim, done in some cases, has not helped. We have not

tried A.C.T.H. in the after-treatment, as we have found it too expensive and the indication too slender.

If the alloplasty of the femoral head in the future is as successful as present experience seems to show, it will be necessary to leave the vitallium cup arthroplasty altogether in favour of the *Judet* procedure[1].

SUMMARY

The preliminary results of 31 Hipcup-arthroplastics a.m. Smith-Petersen are reported. The results can be designed as satisfactory only in 50 %.

RÉSUMÉ

Examen des résultats provisoires obtenus dans 31 cas à la suite d'interventions arthroplastiques de la hanche d'après Smith-Petersen. C'est seulement dans 50 % environ des cas que l'on peut considérer les résultats du traitement comme étant satisfaisants.

ZUSAMMENFASSUNG

Die vorläufigen Ergebnisse der Hüftgelenksplastik nach Smith-Petersen, 31 Falle, werden durchuntersucht. Nur in ungefähr 50 % der Fälle kann das Behandlungsergebnis als zufriedenstellend bezeichnet werden.

[1] Since April 1951 another 68 Arthroplastics have been carried out. In the first 10 cases the *Smith-Petersen* hip cup-method and the *Judet* alloplastic-method were used alternately. The primary results of the acryllic arthroplastics have been much more satisfactory than the results described above and therefore for the time being we have given up the vitallium cup-plastics. It is used only in the colonna-type plastics.