EXPERIENCE WITH THE SHEEHAN KNEE REPLACEMENT

by

G. F. McCoy, FRCS, N. W. McLeod, FRCS and
J. R. Nixon, MCh Orth, FRCS

Withers Orthopaedic Centre, Musgrave Park Hospital, Belfast

UNTIL recent years, patients with osteoarthritis and rheumatoid arthritis had little hope of effective treatment for their painful knees, whereas operations had been developed which could relieve pain in the hip. Arthroplasty of the hip is a standard operation with predictable results. Patients have unfortunately, though not surprisingly, come to expect a similar solution for their arthritic knees—and will be unwilling even to consider an arthrodesis. Although still in the stage of development considerable progress has been made, improving designs reflecting increasing understanding of the functional characteristics of the knee.

Knee arthroplasty, using metal on plastic joints, was commenced on a trial basis at the Withers Orthopaedic Centre in 1974. The results of the first four years, using the Marmor and Geomedic knee replacements, were earlier reported by Lowry, McLeod and Mollan. From late 1977, and especially in the more severely affected knees, the Sheehan prosthesis was used. This paper reports the results after adequate follow-up and discusses their implications.

MATERIAL AND METHODS

The Sheehan prosthesis was used in patients who would previously have been considered suitable for the Geomedic knee replacement, i.e. where both compartments were affected. The bearing materials are chrome-cobalt alloy and high-density polythene (Fig. 1). The high-density polythene, which forms the upper part of the tibial component, is housed in a metal container with an intra-medullary stem. The range of movement of the prosthesis simulates normal knee movement; 5-130° flexion, stability in the extended position without rotation, but with the latter gradually increasing to 20° when the knee is flexed to 60°.2,3

Between December 1977 and October 1980 forty-two Sheehan knee replacements were performed on 38 patients. Two patients had bilateral replacement, two had
revision with a further Sheehan prosthesis (another revision was performed using a
different type of prosthesis). There were 30 females and eight males in the survey.
The mean age was 64.8 years (range 42-79). Twenty-one had rheumatoid arthritis,
16 had osteoarthritis while one had psoriatic arthropathy. Some 15 per cent of
patients in the survey were on systemic steroids. The affected knees had been
symptomatic for more than ten years in 68 per cent of patients. Twelve of the
patients had had previous surgery to the affected knee.

RESULTS

The patients were assessed both pre- and post-operatively using a modified British
Orthopaedic Association Knee Function Assessment Chart. This chart records pre-
operative details of the patient in respect of diagnosis, duration of disease, age,
whether or not there was previous surgery to the knee and, the state of the other
joints. It also records with regard to the knee being replaced pre- and post-operative
pain, ability to walk, use of walking aid and nature of gait, flexion deformity,
maximum flexion, valgus or varus angle, and the ability to get out of a chair and to
climb stairs. Finally, the post-operative assessment of the treatment by the patient is
recorded.

All but two of the patients were available for follow-up, the mean period of which
was 41 months (range 9-57). In 26 arthroplasties the end result was described by the
patients as "good" or "excellent," although two of these operations were revisions
(one for infection, one for loosening). In four cases the results were described as
fair; in two of these the pain, although less severe, continued to be a major problem
while, in the remaining two cases, concurrent medical disease limited rehabilitation.
There were three poor results where, although pain was reduced or abolished, the
pre-operative range of movement was never regained.

Six cases must be considered outright failures. Two of these were due to medical
complications (one cerebro-vascular accident, one peritonitis from perforated
diverticular disease). Three prosthesis became infected and one loosened. All but
one of these were salvaged by successful exchange. However, in the one remaining
case, attempts at arthrodesis were unsuccessful and eventually amputation was
performed. Two patients required re-exploration of the knee and removal of fibrous
tissue, although this did not prejudice the final good result. Delay in wound healing
was a feature of seven cases. One patient required manipulation under anaesthetic
four weeks after initial operation. There was one case of deep venous thrombosis.

The pre- and post-operative flexion deformities and maximum flexion are
illustrated in Figures 2 and 3 respectively. Pre-operative flexion deformity of 20° or
greater in 36 per cent of cases is reduced in the post-operative assessment to 14 per
cent. Almost one-half of the patients regained a flexion range of 100°, denoted a
marked improvement in this aspect of knee function. The most dramatic
improvement is seen in that of pain assessment (Fig. 4). Pre-operatively, all but one
of the patients had either moderate or severe pain such as caused serious disturbance
of life style or interference with sleep. In the post-operative assessment 80 per cent of
patients had either mild pain, or none at all. Some 61 per cent of patients reported
themselves enthusiastic with the operation. Significant improvement in walking
distance after surgery was difficult to assess due to the large number of patients who
had other weight-bearing joints involved.
DISCUSSION AND CONCLUSIONS

The semi-linked Sheehan knee replacement has the advantage of a hinge, while, at the same time, allowing for rotation and a degree of subluxation. Its inherent weakness, however, is the large amount of bone which requires to be removed, making a salvage procedure much more difficult. The best results using this prosthesis are obtained in very unstable knees, where the linkage provides additional stability (Fig. 5).

In this relatively small series the age groups and sex distribution compared closely with that of others. However, the incidence of those with osteoarthritis undergoing arthroplasty in our group (45 per cent) was higher than that found by other workers. The period of follow-up was of sufficient length to assess adequately the efficacy of the prosthesis.
The patient's expectation of successful knee replacement is increased by the generally excellent results of hip arthroplasty. Failure of operation in six patients (16 per cent) is very high when compared with other similar surveys.\textsuperscript{3, 6, 7} Indeed, amputation is a very high price to pay for an elective procedure in a benign condition. The high number of failures or poor results (23 per cent of the total), and the arrival of the technically superior Richard's (R.M.C.) prosthesis has resulted in the virtual cessation of this operation in Belfast. It is concluded that, although results would undoubtedly improve with experience, the Sheehan arthroplasty should be reserved only for the extremely unstable knee.

**SUMMARY**

Forty-two Sheehan semi-linked knee prostheses were inserted in thirty-eight patients between December 1977 and October 1980. Thirty-six of these patients were reviewed after an average follow-up of 41 months. Good or excellent results were obtained in 26 knees, fair results in four knees and poor results in three. There were six failures; two due to unrelated medical complications, three due to infection of the prosthesis and one due to loosening. Three of these failures were salvaged by revision but one patient required amputation. In view of the high percentage of poor results and outright failures and the recent availability of the technically superior Richard's (R.M.C.) total knee replacement, the Sheehan prosthesis is now for only the most grossly unstable knees.
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Correspondence to: Mr. J. R. Nixon, MCh Orth, FRCS, Withers Orthopaedic Centre, Musgrave Park Hospital, Belfast BT9 7JB.

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BOOK REVIEW

FOCUS ON VISION. By RA Weale. (Pp 196, Illustrated. £5.75). London: Hodder and Stoughton, 1982.

FOCUS ON VISION is part of the Biological Science Texts which caters for a wide range of biological interests. This particular text is of modest size but contains a wealth of topical information on the eye, the visual pathways and vision. The first of four chapters, enigmatically entitled "The Window of the Soul," deals with the structure and function of the visual apparatus and has short sections describing the optical and electrical properties of the eye. The cellular organisation of the retina and visual pathways receives particular emphasis, and this section nicely encapsulates much of our current knowledge in this rapidly expanding field of neurophysiology. The second chapter examines the effect of light on various bodily functions and hormone control and discusses its influence on established circadian rhythms within the eye and elsewhere. Chapter Three gives an account of the embryology of the eye and visual pathways and describes the development of the visual processes in early life. The response of the eye to prolonged light exposure and the influence of age on the various components of the visual apparatus are also reviewed. A final chapter deals with perception and includes sections on colour vision, depth perception, stereoscopic vision and illusions.

The book is exceptionally well written with the subject matter well organised and liberally illustrated with figures, tables and diagrams. Each chapter has key references and is followed by a series of searching questions which enables the reader to assess his comprehension of the foregoing information. The book is modestly priced and will have particular appeal to ophthalmologists, especially those in training. Students of biology and psychology will also find this an interesting and informative text.

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