Since its inception, knee arthroplasty has struggled to balance the requirements of relieving pain and restoring function in a durable way. Although highly successful in improving symptoms as measured by traditional outcome measures and achieving longevity, numerous studies have shown the problems that exist, even with well-implanted components of modern design. Some patients complain of ongoing functional limitation, discomfort, and pain.

There are still many challenges in knee arthroplasty. We have a young population that is increasingly active that requires these procedures and yet they are living to a ripe old age and remaining ambulant into their 80s and 90s.

We have focussed for the last decade on improving function and satisfaction in knee arthroplasty but we should not forget the fact that the highest failure rate is seen in our young patients and that we really do need a durable solution that will last several decades.

There are several tensions that need to be considered. Should we resurface the knee early, particularly now that we have access to navigation and robotics and can effectively customize the implants to the patient’s anatomy and their gait pattern? This would allow good function at a young age. Or should we wait as long as possible and risk losing some function for the sake of preserving the first arthroplasty for the lifetime of the patient?

Should we for example accept alignment paradigms that we know give us longevity or should we go with alternative kinematic or anatomical alignment techniques that may well give us better function but could compromise long-term fixation?

Both registries and the long-term studies available suggest that we can expect good survivorship into the second decade for older patients and for some into the third decade, but data beyond that is sparse and is not available with contemporaneous implants. Changing the polyethylene in the knee may prove to be successful but may yet be nowhere near as beneficial as it has been in the hip.

There has also been all too little work to consider the changing physiology of the bone. Will the increasing trend for cementless implants lead to longer lasting osseointegration or will it lead to periprosthetic fractures through areas of stress shielding?

We have been spared somewhat thus far in the knee the issue of local metal ion effects and systemic issues that we have seen in the hip. If our implants last longer and are treated more brutally by an active patient population, we may yet see more problems.
At the same time, we have to continue evolving our technologies and yet be cost effective and affordable. Our focus on operative efficiency, early discharge, rapid recovery and a return to full function must not compromise our goals and plans for implant longevity.

The next stage will no doubt involve close co-operation between surgeons, engineers and industry partners to identify individual surgical targets, select an appropriate prosthesis to minimize soft-tissue strain and develop a reproducible method of achieving accurate implantation. However, in seeking to solve the problems seen in a proportion of arthroplasty patients, the achievements of ‘traditional’ total knee arthroplasty should not be overlooked. The results achieved by such methods in all three domains: pain relief, functional restoration and longevity, should act as baseline measures for newer techniques and designs. Improvements in any one domain should not be at the expense of another. An ideal outcome can only be achieved by an appropriately trained surgeon selecting the optimal prosthesis to implant in the correct position in the well-selected patient.

References:

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