

MENISCUS REPAIR AND TRANSPLANT



Spalding T

University Hospitals Coventry & Warwickshire NHS Trust, Coventry,
United Kingdom

Introduction

The anatomy and microstructure of the menisci allow effective distribution of load across the knee. Meniscectomy results in an altered biomechanical environment and is a potent risk factor for osteoarthritis. Despite the trend towards meniscal preserving surgery, many tears are irreparable and many repairs fail. Meniscal allograft transplantation has been primarily performed for pain in patients with a history of meniscectomy. Numerous case series have reported significant improvements in patient reported outcomes following surgery, and the procedure is no longer considered experimental. There are still however many unanswered questions.

Over 130 meniscal transplantations have been performed at University Hospital Coventry and Warwickshire NHS Trust and current research is directed at determining the chondroprotective effect of meniscal allograft transplantation (1).

Consequences of meniscectomy

The consequences of meniscectomy have been well documented. Damage to the meniscus results in changes to the biomechanical and biochemical environment of the knee, which may lead to Osteo Arthritis (OA) progression in susceptible patients.

Recent studies have shown local biomechanical changes to the articular cartilage and knee joint following meniscectomy, including after partial meniscectomy.

Meniscal Allograft Transplantation (MAT)

In response to reports of the clinical consequences of meniscectomy, meniscal substitution and replacement began to emerge in the 1980's. Since the first reported human meniscal transplantation in May 1984, there have been numerous case series reported in the literature. A recent systematic review reported over 1600 cases, although the total number performed is likely to be many more. It is primarily performed for relief of compartmental pain in patients with a history of meniscectomy, a biomechanically overloaded knee.

Patient reported outcomes from case series studies have been encouraging, but no randomised controlled trials have been performed. Our recent systematic review (3) reported that the mean weighted Lysholm score improved from 55.5 to 82.7 pre-operatively to final follow up (weighted average follow up of 4.5 years). All other functional outcome measures were improved at final follow up.

Pooled complication rates for isolated meniscal transplantation have ranged from 6 to 11%, and the average graft survival time is between 10 and 16 years. Disease transmission and immune rejection are also possible, although extremely unlikely complications. The meniscal allograft is thought to be immuno-privileged and there has only been one reported case of possible rejection.

Chondroprotection

This is the most important question. Currently there is little definitive evidence that this is the case. Sekiya et al (2) compared joint space changes following meniscal allograft transplantation to the contralateral limb, finding no significant differences between the groups. Other studies have found no joint space loss following meniscal transplantation, but others that have found statistically significant joint space losses.

Biomechanical studies support the chondroprotection hypothesis as MAT improves peak contact stresses and total contact area compared with meniscectomy, and animal model studies by Szomor are supportive.

Conclusions

The shape and microstructure of the menisci allow it to effectively distribute load across the knee. Meniscal tears and meniscectomy result in an altered biomechanical and biochemical environment, and are potent risk factors for OA of the knee.

Meniscal allograft transplantation has been performed for over thirty years and multiple case series' have consistently reported improved patient reported outcomes, with a reasonable complication and survival rate.

References

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