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Arthrofibrosis following total knee replacement; does therapeutic warfarin make a difference?

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Abstract

Arthrofibrosis following total knee replacement (TKR) is a relatively common complication which results in a reduction in knee range of movement and patient dissatisfaction.

A retrospective study examined the relationship between anticoagulation with therapeutic warfarin and rates of arthrofibrosis following TKR.

Arthrofibrosis was defined as less than 80° of knee flexion 6–8 weeks post-TKR.

Patients were warfarinised if they had a history of thrombophilic tendencies or medical conditions necessitating anti-coagulation, rather than as routine thromboprophylaxis.

All other patients received thromboprophylaxis using low molecular weight heparin.

A total of 728 patients underwent 874 primary TKR between 1993 and 2002 in one centre, performed by four surgeons. Mean age was 68 years (range 48–89 years) and there were 483 female and 391 male knees.

Eighty cases were warfarinised post-operatively (53 female, 27 male).

Overall, 83 of 874 TKRs (9%) had arthrofibrosis (57 female, 26 male) requiring manipulation under anaesthetic (MUA).

In the warfarinised group, 21 knees (26%) had an MUA (15 female, 6 male).

This compared to 62 cases (8%) requiring MUA in the non-warfarinised group (42 female, 20 male). There was a statistically significant difference on Fisher's exact testing ($P<0.0001$) between groups.

Following MUA, knee flexion improved in 95% cases to a minimum 95° but 8 cases had a fixed flexion deformity of 5–10°.

In conclusion, therapeutic warfarinisation post-TKR leads to a statistically greater chance of the patient developing arthrofibrosis compared to prophylactic low molecular weight heparin and that patients should be counseled appropriately.

Keywords: Total knee replacement; Arthrofibrosis; Warfarin; Therapeutic

1. Introduction

Total knee replacement (TKR) is a frequent and largely successful treatment for the arthritic knee.

Patient function and satisfaction is usually excellent but can be compromised by a poor range of motion. A lack of range of movement can lead to a decreased ability to perform activities of daily living and has been known to contribute towards diffuse chronic knee pain [1].

Multiple factors may contribute to a poor post-operative range of movement following TKR, but pre-operative flexion is the best predictor of post-operative flexion. [2–4]. Patients with a greater range of movement pre-operatively tend to have a greater range of movement post-operatively [5] although patients with a range of movement greater than 0–130° may lose 10° of flexion post-operatively which can lead them to complaining of stiffness [1].

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Thromboembolic complications post-total knee replacement are common (9% clinical deep vein thrombosis, 1.9% non-fatal pulmonary embolus) although fatal pulmonary embolus remains rare (0.4%) [6].

However, thromboprophlaxis following total knee replacement remains a controversial issue. The literature suggests that orthopaedic surgeons should use pharmacological prophylaxis for all high-risk patients undergoing joint replacement in whom benefits appear to outweigh risks [6]. Warfarin is a popular option for such high-risk patients [7].

Equally, warfarin is widely used in medical conditions such as atrial fibrillation and such cardiac co-morbidity is common in patients requiring knee replacement.

This study examines the link between the use of therapeutic warfarin and the development of a poor range of movement following total knee replacement.

2. Methods and materials

A retrospective cohort study examined all primary total knee replacements (TKR) undertaken in one establishment from January 1993 to December 2003 by a group of four surgeons.

Patient data was extracted from an electronic data base using ISYS software (Odyssey Development, Crows Nest, NSW, Australia).

A total of 728 patients with 874 primary total knee replacements were reviewed, with a mean age 68 years (range 48–89). 146 patients had bilateral total knee replacement. Each primary total knee replacement was reviewed individually. In all, 483 TKRs were in females and 391 in males.

Cemented, uncemented and hybrid prostheses were used according to surgeon preference.

For each knee, pre-operative range of movement of the effected knee, the range of movement at each subsequent post-operative follow-up (6–8 weeks, 6 months and 1 year) and whether a manipulation under anaesthetic (MUA) had been undertaken were recorded.

All cases were booked for an MUA if they had less than 80° flexion at 6–8 weeks follow-up, these patients being defined according to Maloney as having arthrofibrosis [1].

Use and type of chemothromboprophlaxis were noted.

Routine thromboprophylaxis used was a daily subcutaneous injection of low molecular weight heparin post-operatively for 7–10 days.

For patients considered at high risk of developing thromboembolic complications, or those on pre-existing anti-coagulation for medical reasons, therapeutic warfarin was used post-operatively.

INR was monitored and maintained between 2 and 3, and anticoagulation was continued a minimum 6 weeks after surgery.

The results obtained were analysed using Fishers exact test and χ^2 to determine the statistical significance of the relationship between requiring an MUA and having been warfarinised. The relative risk of a warfarinised patient developing a stiff knee was also calculated.

The Fisher's exact test and χ^2 were also used to determine the relationships between the need for an MUA, the patient's sex and warfarinisation.

3. Results

Results are illustrated in Table 1.

A total of 874 total knee replacements were reviewed and of these 83 (9%) underwent a MUA because flexion was less than 80° on 6- to 8-week post-operative review (57 female and 26 male). All cases of MUA were performed within 6 months of initial knee replacement surgery.

Of these cases, none were found to have a pre-operative range of movement less than 0–100°.

Eighty cases had been therapeutically warfarinised (53 female and 27 male). Of the 83 cases requiring MUA, 21 had been warfarinised (15 female, 6 male) while 62 had not (42 female, 20 male).

Following MUA, all but 4 cases (95%) improved in flexion to a minimum of 95°. These 4 knees had 75° of flexion at final review but the patients were satisfied with their function and did not want any further intervention. None of the 4 were warfarinised.

A fixed flexion deformity of 5–10° was persistent in 8 other knees, 2 of which were warfarinised.

On χ^2 and Fisher's exact testing to compare the development of a stiff knee post-TKR when warfarinised to development of a stiff knee post-TKR when not warfarinised, a highly statistically significant difference was found ($P<0.0001$).

Relative risk of developing a stiff knee following TKR when warfarinised was calculated to be 3.7 times greater than in the unwarfarinised patient.

Using χ^2 and Fisher's exact tests to compare the development of a stiff knee between females and males, a weaker statistically significant difference was found ($P=0.01$).

No statistical difference was found between warfarinised males and females developing a stiff knee ($P=0.78$).

Table 1
TKR numbers, rates of MUA and statistical differences

	Total	TKRs requiring MUA	% TKRs requiring MUA	Statistical difference
All TKRs in series	874	83	9	
TKRs **not** warfarinised	794	62	8	$p<0.0001$
TKRs warfarinised	80	21	26	