Preoperative anaemia associated with a worse joint specific postoperative outcome after total knee arthroplasty but did not influence patient satisfaction

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Disclosures

Type of study:
Diagnostic study
Retrospective cohort study

Level of Evidence:
Level III

Ethics:
Ethical approval was obtained from the regional ethics committee (Research Ethics Committee, South East Scotland Research Ethics Service, Scotland [16/SS/0026]) for analysis and publication of the presented data. The data collection was carried out in accordance with the GMC guidelines for good clinical practice and the Declaration of Helsinki.

Competing Interest Statement:
The authors declare no conflict of interest with the content of this study.

Aims

Primary:
Assess whether preoperative anaemia was associated with a worse knee specific functional outcome after total knee arthroplasty (TKA).

Secondary:
Assess influence of preoperative anaemia on generic health and patient satisfaction following TKA.

Introduction

Local Definition of Anaemia:
Haemoglobin concentration 130g/L for males and less than 115g/L for females

Pre-operative anaemia affects up to 30% patients undergoing TKA.

No published research into the effect of amaemia on satisfaction post TKR.

One article studied the effect of abaemia on function post TKR, however:
OKS stopped at 6 months instead of 1 year
Regression model did not adjust for specific point scores and generic health FF-36 pre operatively - so pre op status unclear.

Methods

RIE orthopaedic database

Inclusion criteria:
One-year period 2016
Primary TKA
Complete pre and postoperative data

Data collected:
Hb: 2-3/52 pre op, POD1
Patient demographics
Comorbidities
Pre and postoperative Oxford knee score (OKS)
Postoperative (one-year) forgotten joint score (FJS)
EuroQol 5 dimension (EQ-5D) 3L
Patient satisfaction

Results

497/514 patients had complete data:
No difference between those who completed (497) and did not complete (17) questionnaires

Demographics:
215 (43.3%) male
282 (56.7%) female
Overall mean age of 70.0 (range 45 to 93) years
56 (11.3%) patients defined as having preoperative anaemia were:
Significantly older (4.6 years, p<0.001)
More likely to have COPD (p=0.004)
Connective tissue (p=0.047)
Kidney disease (p=0.011)

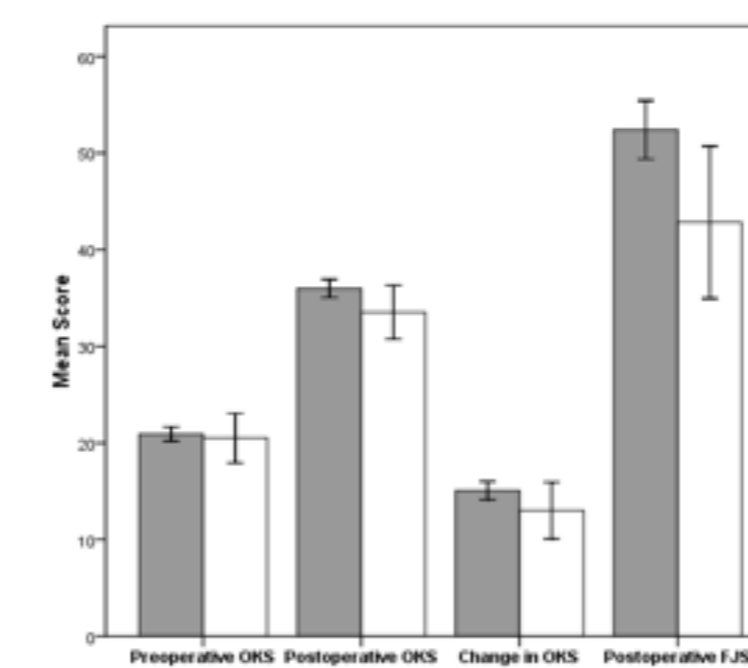**No significant difference between anaemic and non-anaemic groups:**
Preoperative OKS (p=0.752)
Preoperative EQ-5D (p=0.762)

When adjusting for confounding differences between the groups, **there was a significantly lower postoperative OKS (-3.0 points, p=0.035) and FJS (-11.6 points, p=0.011) associated with the anaemia group.**

No significant difference in patient satisfaction at one year following surgery between the groups (odds ratio 0.84, 95% confidence interval 0.62 to 1.53, p=0.976).
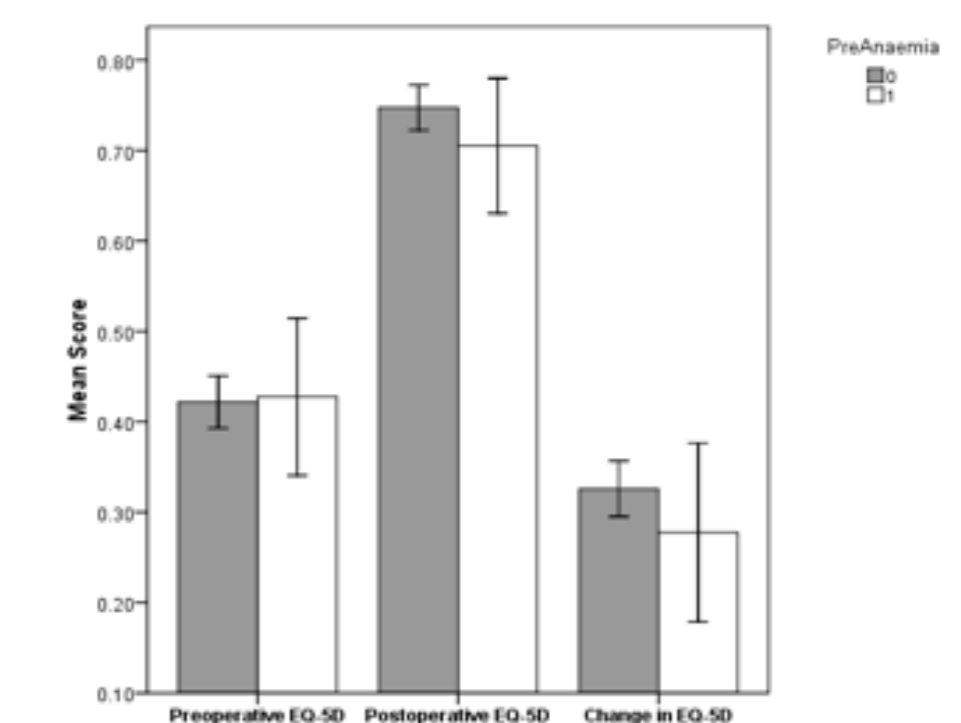
Figures

Figure 1. Mean preoperative, postoperative (one-year) and change in knee specific patient reported outcome measures after TKA according to groups (no preoperative anaemia: grey, preoperative anaemia: white). Error bars represent 95% confidence intervals.


There were no significant differences in the postoperative OKS (p=0.078) or EQ-5D (p=0.200) score or the change in these scores (p=0.133 and p=0.217, respectively) between the two groups. There was a lower FJS demonstrated in the anaemia group of 9.6 points relative to the group without anaemia.

Figure 2. Mean preoperative, postoperative (one-year) and change in EQ-5D scores after TKA according to groups (no preoperative anaemia: grey, preoperative anaemia: white). Error bars represent 95% confidence intervals.


There were no significant differences in the postoperative OKS (p=0.078) or EQ-5D (p=0.200) score or the change in these scores (p=0.133 and p=0.217, respectively) between the two groups.

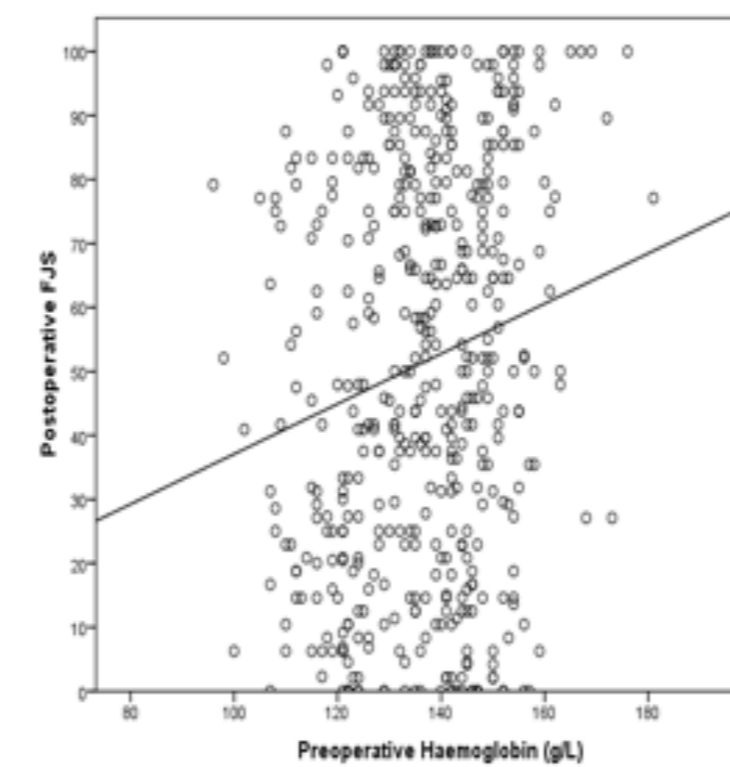**Figure 3.** Scatter plot of preoperative haemoglobin and preoperative OKS with a linear line of best fit.
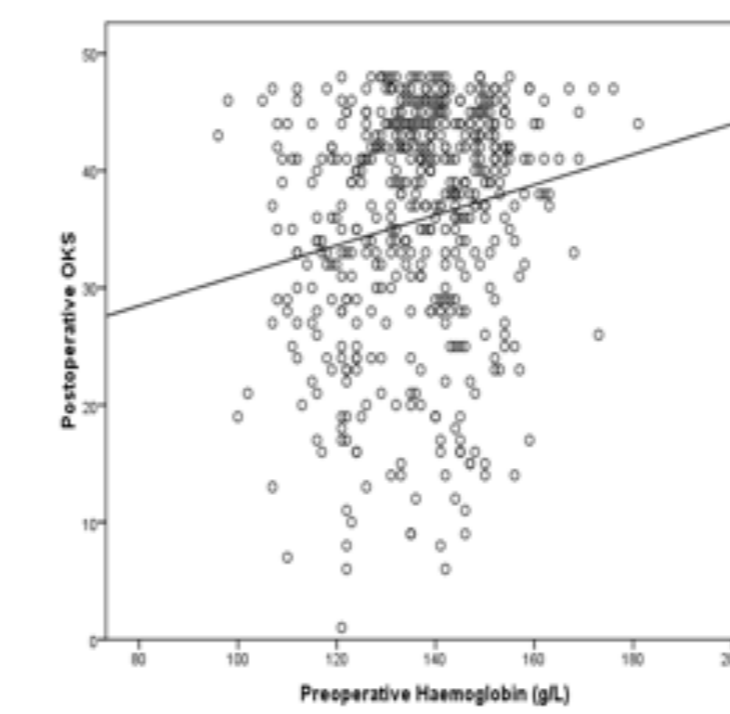
There was a significant correlation between preoperative haemoglobin level and the preoperative OKS (p<0.001, Figure 3), postoperative OKS (p<0.001, Figure 4) and FJS (p<0.001, Figure 5)

Figure 4. Scatter plot of preoperative haemoglobin and postoperative OKS with a linear line of best fit.
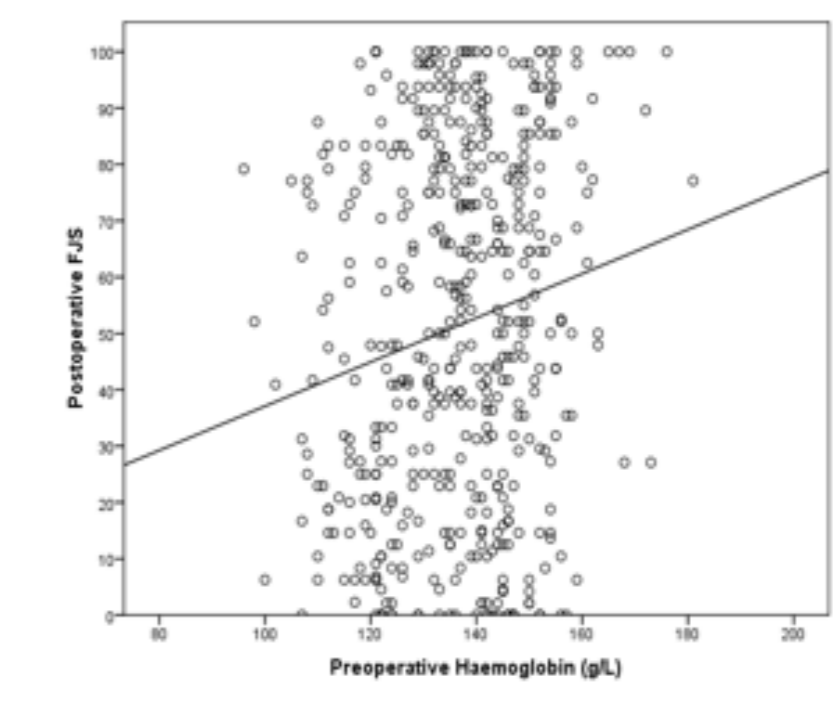
There was a significant correlation between preoperative haemoglobin level and the preoperative OKS (p<0.001, Figure 3), postoperative OKS (p<0.001, Figure 4) and FJS (p<0.001, Figure 5)

**Figure 5.** Scatter plot of preoperative haemoglobin and postoperative FJS with a linear line of best fit.

There was a significant correlation between preoperative haemoglobin level and the preoperative OKS (p<0.001, Figure 3), postoperative OKS (p<0.001, Figure 4) and FJS (p<0.001, Figure 5)

Figure 6. ROC curve for preoperative OKS and postoperative OKS and FJS as predictors of preoperative anaemia.
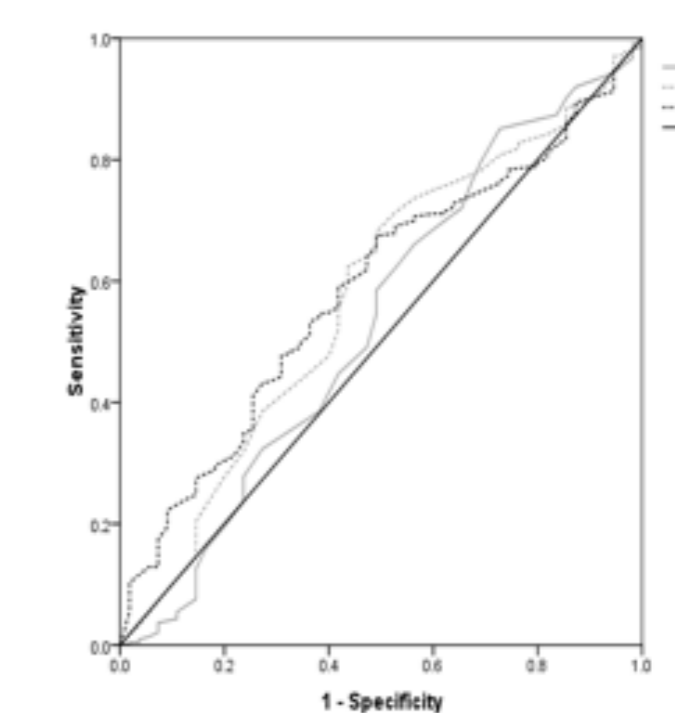
Despite this significant association the preoperative OKS (AUC 53.4% 95% CI 44.7 to 62.1, p=0.414), postoperative OKS (AUC 57.5%, 95% CI 49.3 to 65.7, p=0.069) and FJS (AUC 58.7%, 95% CI 51.3 to 66.0, p=0.036) were not reliable predictors of preoperative anaemia.

Discussion

Strengths:
Good population size
Surgical consistency with standard evidence based technique
2016 All TKA Triathlons
Regression model adjusted for specific point scores and generic health FF-36
OKS and FJS used at 1 yr, most statistically significant and representative of future outcomes

Limitations:
Factors influencing OKS and FJS
OKS does not account for other joint pathologies
FJS does not differentiate between those with worse outcomes
Factors influencing EQ-5d
Low number dimensions and levels could mask other associated health factors
Factors influencing satisfaction after TKA
Likert scale susceptible to bias

Conclusion

Preoperative anaemia is associated with a lower postoperative joint specific functional outcome.

However, these differences may not be clinically significant as these differences were not replicated, and therefore not validated, when testing for patient satisfaction.