



ELSEVIER

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/jor

Original Article

The effect of peri-operative blood loss on postoperative pain following total knee arthroplasty



Paul Hegarty ^{a,*}, Seamus O'Brien ^a, Mike Stevenson ^b, David Beverland ^a

^a Outcomes Department, Musgrave Park Hospital, Belfast BT9 7JB, UK

^b Statistical Advisory Committee, Queen's University Belfast, Belfast BT7 1NN, UK

ARTICLE INFO

Article history:

Received 23 September 2014

Accepted 4 January 2015

Available online 23 February 2015

Keywords:

Arthroplasty

TKA

Pain

Blood loss

Patient satisfaction

ABSTRACT

Aim: This study aimed to investigate a possible link between peri-operative blood loss and post-operative pain following primary total knee arthroplasty (TKA).

Method: A retrospective study was carried out using data from two RCTs (403 patients). Blood loss was estimated using Gross et al's formula. Blood transfusions were factored into calculations. Pain scores were obtained using a visual analogue score.

Results: Multiple regression analysis showed no relationship (0.09) and analysis of variance showed no significant difference ($p = 0.597$). Null hypothesis accepted.

Conclusion: Minimising blood-loss remains an important goal during surgery. On-going efforts should be made to improve patient satisfaction following TKA.

Copyright © 2015, Professor P K Surendran Memorial Education Foundation. Publishing Services by Reed Elsevier India Pvt. Ltd. All rights reserved.

1. Introduction

There are many factors that are recognised as contributing to patient dissatisfaction following Total Knee Arthroplasty (TKA): Age, co-morbidities, function, expectations, mental health and pain.^{1–8} The aim of this study was to investigate the relationship between peri-operative blood loss and pain in the first two months following TKA. It was hypothesised that a direct positive correlation between blood loss and pain in the first two months following TKA would exist, i.e. patients with increased blood loss would demonstrate increased post-operative pain. To date, a number of small studies have

looked at this in the opposite way proposing that post-operative pain could increase post-operative blood loss.^{9–11}

2. Method

This was a retrospective study of 403 patients that had been enrolled in one of two prospective Randomised Controlled Trials (RCTs) performed between 2006 and 2009. Both RCTs contained cementless TKAs only. The first RCT, consisting of 203 patients, compared the LCS RP Porocoat Femur and Tibia to the LCS RP Porocoat Femur and Duofix Tibia (DePuy, UK).

* Corresponding author. Tel.: +44 28 9090 2000.

E-mail address: paul@hegarty.com (P. Hegarty).

<http://dx.doi.org/10.1016/j.jor.2015.01.011>

0972-978X/Copyright © 2015, Professor P K Surendran Memorial Education Foundation. Publishing Services by Reed Elsevier India Pvt. Ltd. All rights reserved.

Table 1 – Patient demographics.

Total # of patients	403
DuoFix study	203
ROCC study	200
Females	242
Males	161
Age (Range)	69 (45–89)
BMI (Range)	31 (20–43)

The second RCT, consisting of 200 patients, compared the LCS DuoFix Femur and DuoFix Tibia to the ROCC Knee (DePuy, UK). All procedures were performed by or under direct supervision of the senior author (DEB). The conclusion of the aforementioned RCT trials was that no significant difference was found between the two groups.

Blood loss was calculated using the formula by Gross et al which estimates blood loss using haematocrit values [Equation (1)].¹² Estimated blood volume was calculated as 65 ml/kg in females and 75 ml/kg in males. This value was then multiplied by the log of the pre-operative haematocrit minus the post-operative haematocrit divided by the pre-operative haematocrit. The majority of patients had bloods on Days 1 and 2 post operatively therefore these values were used in this study.

$$EBL = EBV \times \ln \left(\frac{H_o - H_f}{H_o} \right) \quad (1)$$

TKA is associated with considerable blood loss and historically patients frequently required a blood transfusion post-operatively. Recently, this rate has fallen significantly, largely as a result of changes to transfusion guidelines. This means that the trigger for transfusion with respect to haemoglobin level has dropped significantly.^{13,14} Local transfusion guidelines suggests that transfusion should be considered when the post-operative haemoglobin falls below 8 g/dL for over patients over 65 years and less than 7 g/dL for under 65 years. This threshold is adjusted for patients with a cardiac history to <9 g/dL.¹⁴ For these patients, each unit of

packed red cells transfused, an extra 285 ml of additional blood loss was added to the calculation.

As part of the original prospective RCTs, all patients had been asked to complete a Visual Analogue Score (VAS) to record their pain level. This was performed within one week from surgery and then subsequently at 4 and 8 weeks. Further Oxford pain scores (extracted from the Oxford Hip Score) were recorded during one of the prospective RCTs at 3 months and 1 year post-operatively. Statistical analysis was performed using SPSS v20. Data was compared using multiple regression analysis, one way ANOVA, t-tests and Pearson's correlation. A p value of <0.05 was deemed statistically significant.

3. Results

From the initial 403 patients, 43 had to be excluded from the analysis; 31 due to inadequate pain diaries and a further 12 because of insufficient recording of post-operative haemoglobin values. Patient demographics are summarised in Table 1. Blood loss data was normally distributed.

A total of 15 patients (4%) were transfused with a mean of 1.17 units within the first two days post surgery, this data was included in blood loss calculations.

Multiple regression analysis, on Day 2 post surgery of blood loss values with initial pain score data highlighted no relationship with a multiple correlation coefficient of 0.09. One way ANOVA, used to show significance, which cannot be gathered from regression analysis, showed the difference was not significant ($p = 0.597$). Pearson's correlation, which measures the strength and direction of the linear relationship between two variables, was used to analyse all blood and pain score data [Table 2] and again found no significant difference. Correlation graphs of Estimated Blood Loss (EBL) vs. Pain on Days 1 and 2 post-operatively can be visualised in Figs. 1 and 2 respectively.

One of the RCTs obtained additional VAS pain scores for patients post operatively at 3 months ($n = 182$) and 1 year ($n = 166$). As highlighted in Table 2, no significant difference was found between blood loss and pain at this follow-up time either. Patients at either end of the bell curve (least and greatest calculated values of blood loss) were then analysed further. To do this, independent samples t-tests were performed on patients whose blood loss results were one standard deviation from the mean on Days 1 and 2 post-operatively [Table 3]. No statistically significant difference was found between these groups.

Table 2 – Pearson correlation for Estimated Blood Loss (EBL) vs. Pain scores.

		EBL day 1	EBL day 2
Initial VAS pain score	Pearson correlation	-.032	.033
	Sig. (2-tailed)	.548	.545
	N	360	343
4 Week VAS pain score	Pearson correlation	-.064	-.018
	Sig. (2-tailed)	.224	.734
	N	360	343
8 Week VAS pain score	Pearson correlation	-.031	-.025
	Sig. (2-tailed)	.563	.651
	N	360	343
3 Month VAS pain score	Pearson correlation	-.091	.001
	Sig. (2-tailed)	.223	.986
	N	182	170
1 Year VAS pain score	Pearson correlation	-.059	-.058
	Sig. (2-tailed)	.450	.473
	N	166	154

4. Discussion

TKA continues to have greater patient dissatisfaction when compared to Total Hip Arthroplasty and efforts continue to try and improve this.¹⁵ The present study did not demonstrate any link between the blood lost and pain or Oxford Hip Score in either the early post-operative period or at the intervals up to and including three months and one year.

Therefore, the null hypothesis was accepted: Increasing levels of peri-operative blood loss have no direct relationship with levels of post-operative pain following TKA. Despite this,

Download English Version:

<https://daneshyari.com/en/article/3251715>

Download Persian Version:

<https://daneshyari.com/article/3251715>

[Daneshyari.com](https://daneshyari.com)