



## The association between aspirin and blood loss in hip fracture patients

Muiris T. KENNEDY, Simon ROCHE, Sean M. FLEMING, Brian LENEHAN, William CURTIN

*From Merlin Park Hospital, Galway, Ireland and Portlaoise Hospital, Portlaoise, Ireland*

This is a cohort study involving 98 patients who presented to a regional orthopaedic unit with a hip fracture. Blood loss was assessed by pre and post operative haemoglobin concentrations, and transfusion requirements were used as outcome measures. The influence of pre-operative aspirin use and fracture type was analysed with respect to these outcome measures.

Forty two percent of patients were regular aspirin users, and were comparable to the non aspirin group, apart from having a significantly greater prevalence of atherosclerotic vascular disease. There was no significant difference between the aspirin and non aspirin groups in terms of pre-operative haemoglobin concentrations, peri-operative changes in haemoglobin levels and transfusion requirements.

Fifty one percent of patients had extracapsular hip fractures, and these patients were comparable in terms of demographic characteristics, including aspirin use, to the group with intracapsular hip fractures. The extracapsular hip fracture group were found to have significantly increased peri-operative blood loss as measured by changes in the haemoglobin level, and in transfusion requirements when analysed against the intracapsular hip fracture group. We found that it is the fracture site, rather than aspirin use pre-operatively, that is predictive of blood loss and transfusion requirements in patients presenting with hip fractures.

**Keywords :** hip fracture ; blood loss ; transfusion requirements ; aspirin.

### INTRODUCTION

Acetylsalicylic acid (aspirin) is a non-steroidal anti-inflammatory drug, which has been well documented to cause a prolongation of bleeding time, due to the irreversible acetylation of platelet cyclooxygenase (10). This systemic haemostatic defect continues until megakaryocyte precursors produce sufficient numbers of unmodified platelets. As a consequence, it has become routine surgical practice to discontinue aspirin for up to two weeks prior to elective procedures. There is undisputed data supporting the beneficial risk reduction of aspirin with regard to myocardial infarction and thromboembolic stroke (13, 15). However, the evidence behind the widespread practice of stopping aspirin to decrease perioperative

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■ Muiris T. Kennedy, MB, BCh, MRCSI, Orthopaedic Registrar.

■ Simon Roche, MB, MCh, MRCSI, Orthopaedic Registrar.

■ Brian Lenehan, MB, MCh, MRCSI, Orthopaedic Registrar.

■ William Curtin, MB, MCh, FRCSI, Orthopaedic Consultant.

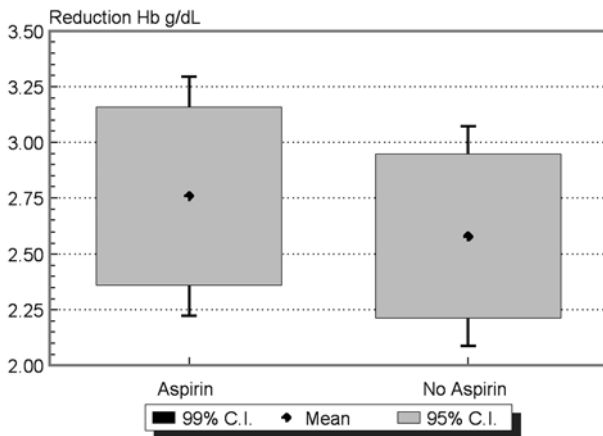
*Department of Orthopaedics, Merlin Park Hospital, Galway, Ireland.*

■ Sean M. Fleming, MD, MRCPI, Cardiology Consultant.  
*Department of Cardiology, Portlaoise Hospital, Portlaoise, Co. Laois, Ireland.*

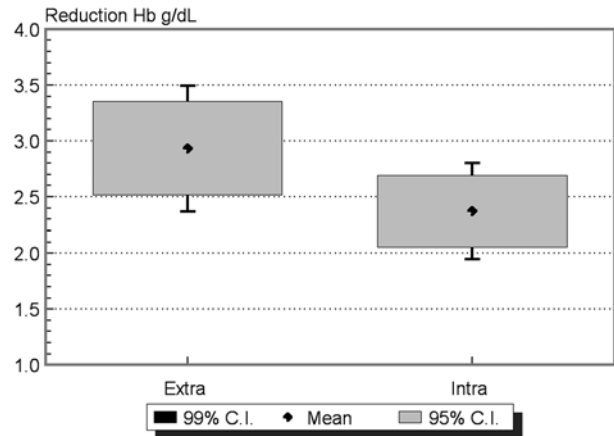
Correspondence : Muiris Kennedy, 25 Carriglea Killenard, Co. Laois, Ireland. E-mail : mugrca@hotmail.com.

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**Fig. 1.** — Reduction in measured haemoglobin after fracture repair in aspirin takers (aspirin) and non-aspirin takers (no aspirin), mean (dot), 95% confidence intervals (box) and 99% confidence intervals (whiskers) ( $p = 0.58$ , t-test).



**Fig. 2.** — Reduction in measured haemoglobin after repair of extracapsular (extra) and intracapsular (intra) hip fracture, mean (dot), 95% confidence intervals (box) and 99% confidence intervals (whiskers) ( $p = 0.04$ , t-test).

bleeding appears to be contradictory, with some studies indicating a clinically significant increased haemorrhagic effect (6, 14, 16), while others show data which suggest the inverse is true (4, 11, 17). There is a relative paucity of literature regarding the risk of excessive bleeding in orthopaedic surgery when aspirin is used preoperatively. There is also a dearth of published data relating to the differential blood loss associated with intracapsular versus extracapsular hip fractures. The aim of this study was to elucidate the relationships between blood loss, costly blood transfusions (9) and the hip fracture site, as well as aspirin use preoperatively.

## METHODS

This is a case controlled cohort study in consecutive patients who presented to a regional trauma centre, with femoral neck and intertrochanteric hip fractures.

Patients with abnormal coagulation profiles, on oral coagulation therapy, with haematological disorders or whose surgery was delayed more than 48 hours following admission were excluded from the study. Operative fixation included Dynamic Hip Screw (DHS) for extracapsular hip fractures, and hemiarthroplasty for intracapsular hip fractures with either an Austin Moore prosthesis or a bipolar hemiarthroplasty prosthesis.

The outcome measures were transfusion requirements, difference in measured haemoglobin (Hb) pre

and post operatively ; for this measure we excluded from the analysis patients who received intra-operative blood transfusions ( $n = 5$ ). Post-operative full blood counts were taken at hours following the surgical procedure.

Data was analysed using GB Stat V6.5 (Dynamic Microsystems, US). Variables were tested for normality. For normally distributed variables we report mean values and 95% confidence intervals (95% CI) and we test for significance using Students t-test. For non-normally distributed variables we report median values and inter quartile ranges (IQR) and test for significance using Wilcoxon's rank sum test. The Fisher's exact chi square test was performed for binary tables. In each case a  $p$  value of less than 0.05 is taken as significant.

## RESULTS

In total 98 patients met inclusion criteria, they were an older group of patients (median age 82, IQR 78-87, 26.5% Male). Fifty (51%) fractures were extracapsular. Average pre-op Hb for the group as a whole was 12.4g/dl (95% CI 12.1-12.7), average Hb drop was 2.5g/dl (95% CI 2.2-2.8). Twenty seven patients required transfusions, five of which were intra-operative. Two patients received one unit of packed red cells, 22 received two units, and three patients received four units. Forty (40.8%) were taking aspirin. Baseline characteristics were similar in the aspirin taking and non-

Table I. — Demographic characteristics, Aspirin and non-aspirin takers. (Extra – Extracapsular)

	Aspirin	Non-Aspirin	p
N	40	58	
Age (Median, IQR)	84 (80-87)	80.5 (75-87)	0.19
Gender (n, % Female)	32 (80%)	40 (69%)	0.06
Fracture (n, % Extra)	20 (50%)	28 (48%)	0.51
History Vascular Disease (n, %)	17 (43%)	8 (14%)	0.001

Table II. — Demographic characteristics, Extracapsular and Intracapsular fracture groupings

	Extracapsular	Intracapsular	p
N	50	48	
Age (Median, IQR)	82.5 (78-87)	81.5 (77-86)	0.75
Gender (n, % Female)	37 (74%)	35 (73%)	0.54
Aspirin (n, % Using)	20 (40%)	20 (42%)	0.51
History Vascular Disease (n, %)	15 (30%)	10 (21%)	0.2

aspirin groups (table I). The aspirin taking group had a significantly greater prevalence of pre-existing atherosclerotic vascular disease.

No significant differences between the aspirin and non-aspirin takers were observed in pre-operative haemoglobin (12.5 g/dl, 12.3 g/dl respectively,  $p = 0.37$   $n = 98$ ); haemoglobin reduction post-operatively (2.8 g/dl, 2.6 g/dl respectively,  $p = 0.58$ ,  $n = 93$ , fig 1); or in the proportion receiving a transfusion (30%, 26% respectively,  $p = 0.41$ ,  $n = 98$ ).

Taking into consideration fracture location, there was no significant difference ( $p = 0.17$ ) in the pre-operative haemoglobin levels between the intra (12.2 g/dl) and extra (12.6) capsular hip fracture groups. Baseline characteristics between the two groups were similar (table II). However extracapsular hip fracture resulted in a drop of 2.9 g/dl versus 2.4 g/dl for the intra capsular group ( $p = 0.04$ , fig 2). This was reflected in transfusion requirements with significantly more patients (36% vs 19%) with an extracapsular fracture requiring a transfusion ( $p = 0.045$ ).

## DISCUSSION

As evidence showing efficacy for the use of aspirin grows in relation to coronary artery disease,

embolic stroke, colonic adenocarcinoma and Alzheimer's dementia, so the number of elderly patients prescribed low dose aspirin increases (2, 5, 8, 12). The prolongation of bleeding time associated with aspirin due to cyclooxygenase inhibition is well documented (10). Amrein *et al* however, found that while aspirin produced a prolongation of the bleeding time compared with the controls, there was no correlation with increased blood loss in elective THA patients (1). In a retrospective analysis Fauno *et al* contradicted these results concluding that pre-operative NSAID use in elective THA patients resulted in a increased peri-operative blood loss (6) Other studies in non-elective procedures supported the hypothesis that aspirin was not associated with a greater perioperative blood loss (3, 7, 11), but did find a relationship with aspirin use and the requirement for postoperative transfusion (3, 11) (table III). In this study, we find that there is no significant difference between those patients on aspirin preoperatively, versus those that were not, in terms of preoperative haemoglobin levels, blood loss or transfusion requirements.

With the exception of Swain *et al*, the relative blood loss between intra and extra capsular hip fractures throughout their perioperative course is poorly documented in the literature (17). Our findings concur with Swain *et al* in respect to transfusion

Table III. — Comparative table of studies looking at the effects of pre-operative aspirin  
 Results refer only to those outcome measures in which the aspirin group differed significantly from the non aspirin group.  
 B.L = Peri-operative Blood Loss.  $\Delta$  Hb = Peri-operative decrease in Hb. Transfusion = Transfusion requirement.  
 CABG = coronary artery bypass graft

	Manning <i>et al.</i> (11)	Anekstein <i>et al.</i> (3)	Kennedy <i>et al.</i> (This paper)	Reich <i>et al.</i> (14)	Sethi <i>et al.</i> (16)
Number	89	104	98	197	772
% on Aspirin	36	37.5	41	44	61
Surgery	Hip fracture surgery	Hip fracture surgery	Hip fracture surgery	Elective CABG	Elective CABG
Outcome measures	B.L, $\Delta$ Hb, Pre-op Hb,	$\Delta$ Hb, Transfusion. Tranfusion.	Pre-op Hb, Transfusion, $\Delta$ Hb	B.L from drains, Transfusion.	B.L, Transfusion.
Results in the aspirin group.	$\downarrow$ Pre-op Hb, $\uparrow$ Transfusion.	$\uparrow$ Transfusion.	–	$\uparrow$ Drain B.L	$\uparrow$ B.L, $\uparrow$ Transfusion.

requirements being higher in patients with extra-capsular hip fractures. However, we also found that the peri-operative decrease in haemoglobin was greater in the extra-capsular hip fracture group. Therefore, future studies into the causes of blood loss in hip fracture patients must take into account the type of fracture involved.

In conclusion, we found that instead of aspirin being the predictive factor relating to blood loss and transfusion requirements in these patients, it is the fracture type that was of significance.

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