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Research Study

Influence of Anaesthesia on Mobilisation Following Hip Fracture Surgery: An Observational Study
麻醉技術對髖部骨折病人術後活動能力的影響：一項觀察性研究

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ABSTRACT

Background: Anaesthetic technique can influence mortality and morbidity following hip fracture surgery. However, its influence on postoperative mobilisation is not clear. In this study, we evaluated the influence of anaesthetic technique on postoperative mobilisation.
Methods: In this prospective observational study, we included all consecutive patients who underwent surgery for hip fracture between 1 January 2012 and 31 December 2013 at our institution. Any patients who died prior to mobilisation or who could not be followed up after surgery were excluded. Data was collected on demographics, clinical characteristics, anaesthesia technique and surgical factors, and date and time of admission, operation, first mobilisation and discharge.
Results: Of the 1040 patients included in the analysis, 264 received general anaesthesia only (Group GA), 322 received general anaesthesia with regional anaesthesia (Group GARA), and 454 received central neuraxial blockade anaesthesia with or without sedation (Group CNB). There was no significant difference in age ($p = 0.56$), sex ($p = 0.23$), number of comorbidities ($p = 0.06$), residential status ($p = 0.18$), time to surgery ($p = 0.10$) and length of hospital stay ($p = 0.30$) between the three groups. There was a statistically significant difference in ASA grade ($p = 0.01$), implant type used ($p = 0.04$), grade of operating surgeon ($p = 0.02$) and grade of anaesthetist during surgery ($p = 0.004$) among the three groups. Patients in Group GARA had a median time-to-first mobilisation of 23.8 hours after surgery, compared to 24.1 hours in Group GA and 24.3 hours in Group CNB. This difference was not statistically significant after controlling for confounding factors ($p = 0.45$).
Conclusion: Our results show that anaesthetic technique does not influence time-to-first mobilisation after hip fracture surgery.

中 文 摘 要

摘要: 背景:麻醉技術可以影響髖部骨折手術病人術後的死亡率和發病率。然而,它對病人術後活動能力的影響尚不清楚。在此研究中,我們評審了麻醉技術對術後活動能力的影響。
方法: 在所有前瞻性收集的數據進行回顧性分析,包括從2012件1月1日至2013年12月31日在我們的機構接受了髖部骨折手術的病人。主要結果包括由手術到病人第一次起來步行的時間。
結果: 在分析中的1040名病人,當中264人接受全身麻醉(General Anaesthesia, GA組別),322人接受全身和局部麻醉(General and Regional Anaesthesia, GARA組別),和454人接受中央阻斷(附上或沒有附上鎮靜)(Central neuraxial blockade with or without sedation, CNB組別)。三組之間的年齡($p = 0.56$),性別($P = 0.23$),已有疾病($p = 0.06$),住宅狀態($p = 0.18$),手術等候時間($P = 0.10$)和住院天數($P = 0.30$)皆沒有顯著差異。三組之間的ASA分級($P = 0.01$),手術值入物類型($P = 0.04$),手術醫生的年資($P = 0.02$)和麻醉醫生的年資($P = 0.004$)有統計學差異顯著。GARA組別病人的中位時間是手術後23.8小時,相對於GA組別的24.1小時和CNB組別的24.3小時。在控制了混雜因素之後,這種差異無統計學上的顯著分別($P = 0.45$)。
結論: 我們的研究結果表明,麻醉技術不影響由髖部骨折手術到病人第一次起來步行的時間。

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Introduction

Hip fracture is the most common condition requiring emergency orthopaedic surgery both in the United Kingdom (UK)[1] and worldwide.[2,3] In the UK, the annual incidence of hip fractures is projected to rise from 70,000 to over 100,000 cases per annum by the year 2020.[4] By contrast, the worldwide incidence of hip fractures among elderly is estimated to rise from 1.7 million per annum, in 1990, to 6.3 million by 2050.[2] The management of these injuries, therefore, poses a major clinical challenge and financial burden on health resources. It is estimated that the overall cost of hip fracture care in the UK would rise from current £2 billion per annum[4] to £3.6–5.6 billion per annum by 2033.[5]

Bed occupancy for hip fractures is in excess of 1.5 million days which represents 20% of the total orthopaedic bed occupancy annually.[4] For individual patients, the length of stay (LOS) represents the highest contributor (84%)[6] to direct hospital care cost, which ranges from £12,000[6] to £18,000[7] per patient. Reducing LOS could significantly ease the financial cost of hip fracture care with the release of expensive bed resource to other patients.[8] Early ambulation following hip fracture surgery is considered good clinical care[1,4,9–11] and has been linked to shorter hospital stay.[12] Although what constitutes early ambulation is not clearly identified in various clinical guidelines,[1,4,9–11] it is recommended that patients should be mobilised as soon as possible or permissible after surgery and preferably within 24 hours.[1,4,11,12]

Pain following surgery is procedure specific.[13] Inadequate pain relief is associated with a negative impact on rehabilitation.[14] Although perioperative regional anaesthetic techniques are associated with reduced pain levels and reduction in supplementary analgesic requirement, superior analgesia does not translate into enhanced rehabilitation.[15] The aim of this study was to prospectively analyse the practice of postoperative early mobilisation in hip fracture patients at our institution and to determine the influence of anaesthetic technique on the time-to-first-mobilisation (TTFM) after surgery.

Methods

Ethics

The study was a retrospective analysis of prospectively collected data as a part of quality improvement program and was authorised by local research and audit governance department, which confirmed that the project fulfilled the criteria of a clinical audit as defined in the NHS National Research Ethics Service document "Defining Research";[16] therefore, formal ethical approval from NHS research and ethics committee is not deemed necessary.

Data source

As an initiative to monitor and improve the quality of care delivered to hip fracture patients, a local hip fracture database was developed and maintained at our institution from 1st May 2009. All patients admitted with the diagnosis of hip fracture were identified from locally developed Virtual Trauma Orthopaedic Management System (Medipex Ltd., Leeds, UK). Data regarding identified patients with hip fracture was directly fed into an excel spread sheet (Microsoft Corporation, Redmond, WA, USA). Data regarding patient demographics and admission-to-discharge timeline were entered by trauma coordinators. Data concerning comorbidities, operation factors, and anaesthesia technique were entered by the attending anaesthetist involved with the perioperative management of patient. Data concerning postoperative follow up variables, first mobilisation time, and analgesia prescribed and administered was obtained from patient notes and entered into the database by the authors(s) during their follow-up visits. Data capture was < 100% because of reliance on a multidisciplinary team, trauma coordinators, attending anaesthetists, and authors for data collection. Postoperative data was more often missed because of discharge of patient from hospital in the time lag between operation and subsequent follow-up by authors. All data were collected contemporaneously during patient stay in the hospital.

This study was a retrospective analysis of prospectively collected data derived from locally held hip fracture database. We defined the study population as all consecutive patients admitted with diagnosis of hip fracture in our hospital during the study period. We defined the study period arbitrarily dating from January 1st, 2012 to December 31st, 2013. Data were collected regarding demographic factors, including age, gender, American Society of Anesthesiologists (ASA) grade, and preadmission residential status for all patients. We categorised preadmission residential status into the following groups: (1) patients who were admitted from their own home or sheltered housing; (2) patients who were admitted from a residential home; (3) patients who were admitted from a nursing home; and (4) patients who had their hip fracture episode as inpatients (either at our institute or transfers from another hospital).

Clinical factors, including the number of comorbidities present at the time of admission and operative features, such as implant type, time to surgery from admission, grade of operating surgeon, grade of anaesthetist, and the type of anaesthetic technique uses for surgery, were recorded for all patients. The number of comorbidities was categorised as none, one to three, and four or more. Time to surgery was recorded as being < 48 hours or > 48 hours from initial presentation or injury and was calculated from presentation to Accident and Emergency (or from time of injury for inpatients) to the time patients were transferred to the operating theatre after receiving anaesthesia. Data regarding the grade of surgeon and anaesthetist were dichotomised to consultant or nonconsultant grades. A consultant is a clinician who has completed a minimum of 9 years of training in said specialty after graduation from medical school. The type of anaesthetic technique was recorded as general anaesthesia (GA) only, GA with regional anaesthesia (GARA) including a nerve block (fascia iliaca, femoral, and lumbar plexus blocks either as a single infiltration or a continuous catheter placement) or epidural analgesia or inadequate spinal block converted to GA, and central neuraxial blockade anaesthesia (CNB) including spinal, epidural or combined spinal-epidural anaesthetic.

Date and time of admission and discharge were recorded and used to determine the hospital LOS for every patient. Data regarding inpatient deaths were also collected including the date of death. We used the definition of mobility given by National Institute of Clinical Excellence (NICE)[1], change in posture, rather than ability to walk, as a functional outcome. The first postoperative mobilisation was defined as the first episode of a patient sitting out from the hospital bed into a chair for a minimum of 30 minutes with or without assistance and regardless of weight-bearing ability. TTFM was calculated in hours from the time recorded at the start of induction of anaesthesia to the time when patients were first mobilised with assistance from a physiotherapist. The prescription of regular postoperative analgesia, including paracetamol, derivatives of codeine, tramadol and nonsteroidal anti-inflammatroy drugs (NSAIDs), and rescue analgesia in the form of oral oxycodone, morphine or parenteral morphine was noted. The administration of rescue analgesia prior to mobilisation after hip surgery was also recorded.

Inclusion criteria

All consecutive patients undergoing hip fracture surgery during the study period, from January 1st, 2012 to December 31st, 2013, were included in the study.

Exclusion criteria

ASA Grade V patients, patients who died prior to mobilisation and patients with missing data on time of first mobilisation were excluded from the final analysis.

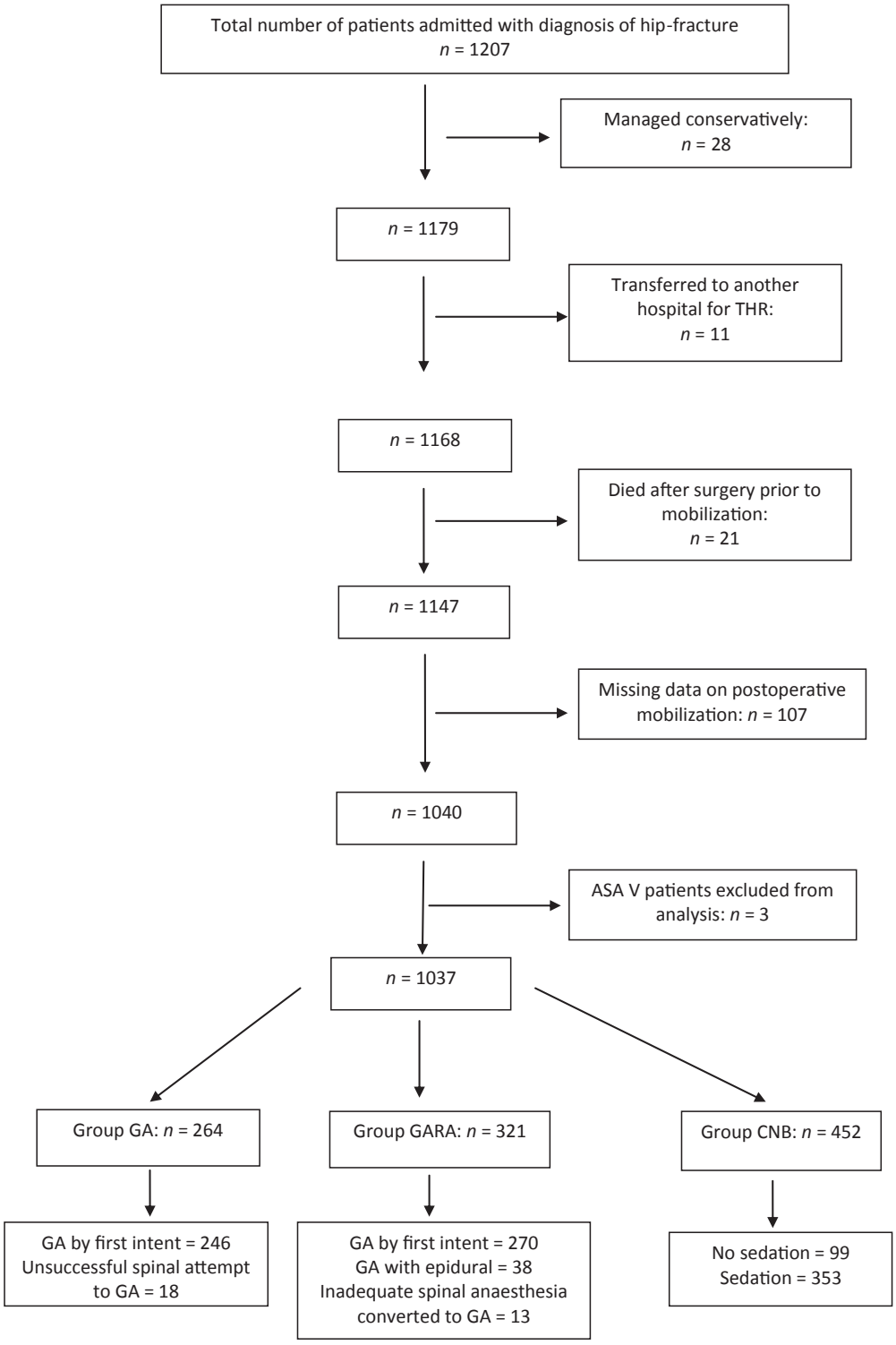

Figure 1. Patient distribution flowchart.

Primary outcome measure was the mean of TTFM in each group. We chose TTFM as a primary outcome measure for three reasons. (1) Considering that > 5% of patients are either wheelchair bound or nonweight bearing prior to their fracture,[24] sitting hip fracture patients out from bed into a chair is reflective of their functional status, which is a more relevant outcome for these frail patients. If we had chosen weight bearing or walking as outcome measures, such patients (nonweight bearing) needed to be excluded from the study, which might have decreased the studied patient population, thereby possibly weakening the analysis. (2) This study was primarily aimed at evaluating the influence of anaesthesia on postoperative mobilisation. Considering weight bearing and walking after hip fracture surgery is hugely influenced by the pre-fracture mobility status of patients with hip fracture, the fracture type (extra or intra-capsular), and operative fixation (hemiarthroplasty, dynamic hip screw, or intramedullary nail) performed;[25] and are therefore, are more relevant as an outcome measure to evaluate the impact of surgical factors on postoperative mobilisation. (3) Although pain is considered as a limiting factor for postoperative rehabilitation following hip fracture surgery,[14] it is the dynamic pain (associated with mobilising patient out-of-bed)[13] which is more relevant to postoperative rehabilitation and is influenced by anaesthetic techniques.[15]

Secondary outcome measures included the proportion of patients mobilised within 24 hours following surgery and the proportion of patients requiring rescue analgesia prior to first mobilisation and hospital LOS.

All patients were assessed for risks prior to mobilisation by our physiotherapist, according to predetermined criteria (proforma attached as Appendix A).

Statistical analysis

Considering this was an observational study (retrospective analysis of prospectively collected data), it was not deemed necessary to perform power analysis or sample size collection.Such statistical tool are primarily used in prospective and randomised studies.[26] Therefore, in this study a univariate analysis was undertaken to determine differences between patients receiving GA only, GARA or CNB with or without sedation. Normality tests were performed to assess the distribution of all continuous variables. Descriptive statistics of median and interquartile range were calculated for nonparametric continuous variables and percentage proportions for categorical variables. The Kruskal–Wallis test was used to compare continuous variables, and categorical variables were compared using the Chi-square test. A p value < 0.05 was considered statistically significant. Multivariate logistic regression analysis was subsequently performed using TTFM as the dependant variable (dichotomised to mobilisation within or after 24 hours) with a view to control the effect of confounding factors on the type of anaesthetic technique used.

Table 1
Demographics and clinical characteristics for all patients (n = 1,040)

Characteristic	Study groups			p
	Group GA, n = 264	Group GARA, n = 321	Group CNB, n = 452	
Age (y)	83.5 (77–88)	82 (76–88)	83 (77–88)	0.56 (KW)
Sex				
Male	62 (23.5)	66 (20.5)	117 (25.8)	0.23 (CS)
Female	202 (76.5)	256 (79.5)	337 (74.2)	
ASA Grade				
ASA I	26 (10)	26 (8.1)	26 (5.8)	0.01 (CS)
ASA II	136 (52.3)	170 (53)	218 (48.3)	
ASA III	73 (28.1)	104 (32.4)	140 (31)	
ASA IV	25 (9.6)	20 (6.2)†	65 (14.4)†	
Missing data	4	1	3	
Residential status				
Own home/sheltered home	94 (35.7)	116 (36.5)	197 (43.6)	0.18 (CS)
Residential home	125 (47.5)	140 (44)	195 (43.1)	
Nursing home	12 (4.6)	16 (5)	16 (3.6)	
Inpatient	32 (12.2)	46 (14.5)	44 (9.7)	
Missing data	1	4	2	
Time to surgery (h)				
< 48	199 (75.4)	240 (74.5)	309 (68.1)	0.05 (CS)
> 48	65 (24.6)	82 (25.5)	145 (31.9)	
Consultant anaesthesia induction	222 (86)	275 (87.3)*	354 (79)†	0.004 (CS)
Missing data	6	7	6	
Consultant surgeon operation	69 (26.7)†	119 (37.8)	155 (34.7)	0.02 (CS)
Missing data	6	7	7	
Implant used				
CHS/DHS	94 (34)	116 (36.5)	197 (43.6) †	0.04 (CS)
Uncemented hemiarthroplasty	125 (45.1)	140 (44)	195 (43.1)	
Cemented hemiarthroplasty	12 (4.3)	16 (5)	16 (3.5)	
Intramedullary fixation	46 (16.6)*	46 (14.5)	44 (9.7)†	
No. of comorbidities				
None	25 (8.6)	26 (8.2)	26 (5.8)	0.06 (CS)
1–3	191 (73.2)	250 (78.6)	334 (74.4)	
≥ 4	45 (17.2)	42 (13.2)	89 (19.8)	
Missing data	3	4	5	
Length of stay (d)	20.3 (12.7–28.8)	17.9 (11.8–27.8)	18.5 (12.9–29.7)	0.30 (KW)
Time to first mobilisation	24.1 (21–45)	23.8 (20.3–43.2)	24.3 (21.3–44)	0.10 (KW)

ASA = American Society of Anesthesiologists; DHS/CHS = dynamic hip screw/compression hip screw.
Data are presented as n (%) or median (interquartile range).
*Chi-square by cell test significant at the level of significance alpha = 0.050 ± Chi-square by cell test significant at the level of significance alpha = 0.010.

Results

During the study period from January 1st, 2012 to December 31st, 2013, a total of 1168 patients underwent hip fracture surgery at our institution. Of these consecutive 1168 patients, 128 were excluded as per our exclusion criteria. A total of 1040 patients were, thus, included in the analysis (Figure 1). Of these, 264 (25%) patients received GA only (Group GA), 321 (31%) patients received GARA (Group GARA), and 452 (44%) patients received CNB (Group CNB). The demographic and clinical characteristics of patients in these three groups are summarised in Tables 1 and 2.

In Group GA, 246 (93.2%) patients received GA as the first intent, whereas 18 (6.8%) patients were converted to GA due to unsuccessful spinal attempt. In Group GARA, 270 (84%) patients received GA as the first intent with a nerve block, whereas 38 (11.8%) patients received GA with epidural and 13 (4%) patients were converted to GA due to inadequate spinal anaesthesia. Of the patients who received nerve blocks, 224 (69.5%) of them had femoral nerve block, 32 (9.9%) had lumber plexus block, 19 (5.9%) had fascia iliaca block, and five (1.5%) received continuous lumber plexus catheter. Furthermore, 38 (11.8%) patients who received epidural with GA were also included in Group GARA rather than in Group CNB with sedation because GA was the primary anaesthetic technique and epidural was placed secondarily for postoperative analgesia. In Group CNB, 446 (98.2%) patients received spinal anaesthesia, four (0.8%) patients received combined spinal epidural, and four (0.8%) patients received epidural. Additionally, 353 (78.9%) patients and 99 (21.8%) patients either received or did not receive sedation, respectively (Table 3).

A total of 548 (53%) patients were mobilised within 24 hours after surgery; 135 (51%) patients, 182 (57%) patients, and 231 (51%) patients in Groups GA only, GARA, and CNB, respectively. Postoperative mobilisation was delayed in 32 (3%) patients (GA = 8, GARA = 7, CNB = 17) due to inadequate pain relief, whereas in 131 (13%) patients (GA = 35, GARA = 42, CNB = 36), 24 (2%) patients (GA = 5, GARA = 8, CNB = 11), 17 (1.6%) patients (GA = 4, GARA = 4, CNB = 9), and 76 (7%) patients (GA = 22, GARA = 17, CNB = 37), postoperative mobilisation was delayed for medical, surgical, noncompliance or organisational reasons, respectively. Unfortunately, in 209 (20%) patients, no reason was documented by the physiotherapist for the delay in mobilisation.

Table 2
Results of analysis of covariance comparing time to first mobilisation by anaesthetic groups controlling for confounding factors*

Descriptive statistics			
Group	Mean	Standard deviation	*n*
GA	34.494	22.341	248
GARA	31.508	18.347	302
CNB	33.984	22.636	429
Total	33.349	21.341	979

Test of between patient effects					
Source	Type III Sum of squares	*df*	Mean square	*F*	Sig.
Corrected model	14196.202[a]	11	1290.564	2.894	0.001
Intercept	2101.070	1	2101.070	4.712	0.030
Anaesthetic group	1039.567	2	519.783	1.166	0.312
Sex	472.348	1	472.348	1.059	0.304
Age	215.422	1	215.422	.483	0.487
ASA	655.984	1	655.984	1.471	0.225
Implant	2719.122	1	2719.122	6.098	0.014
TTS	4932.570	1	4932.570	11.061	0.001
Residential status	.699	1	.699	0.002	0.968
Consultant anaesthetist	2305.678	1	2305.678	5.170	.023
Consultant surgeon	60.535	1	60.535	0.136	0.713
No. of comorbidities	63.445	1	63.445	0.142	0.706
Error	431222.778	967	445.939		
Total	1534234.783	979			
Corrected total	445418.980	978			

df = difference; TTS = time to surgery.
* Dependant variable: Time to 1st mobilisation.

Table 3
Perioperative sedation used during central neuraxial blockade anaesthesia

Characteristic	*n* = 454
No sedation	99 (21.8)
Propofol as target controlled infusion	46 (10.1)
Propofol in incremental boluses	67 (14.7)
Midazolam plus ketamine	85 (18.7)
Propofol plus ketamine	69 (15.1)
Ketamine only	54 (11.9)
Others	34 (7.5)

Data are presented as *n* (%).

Although patients in the Group GARA had a lower median TTFM after surgery of 23.8 hours than those in Group GA (24.1 hours) and Group CNB (24.3 hours), this difference was not found to be statistically significant (Kruskal–Wallis test, $p = 0.10$). There was no significant difference in patients' age at the time of surgery between the three groups (Kruskal–Wallis test, $p = 0.56$). The female to male ratios were 1:3.3 in Group GA, 1:3.9 in Group GARA, and 1:2.9 in Group CNB (Chi-square test, $p = 0.23$). There was a statistically significant difference in ASA grade (Chi-square test, $p = 0.01$) between the groups; however this difference was only limited to a higher proportion of patients with ASA Grade IV (14%) in Group CNB compared with those in Group GARA (6%).

There was no difference in the preoperative residential status between the three groups (Chi-square test, $p = 0.18$). Similarly, no difference was found in the number of comorbidities between the three groups (Chi-square test, $p = 0.06$), with the majority of patients in all three groups having 1–3 comorbidities. The majority of patients in all three groups underwent surgery within 48 hours of presentation, and there was no significant difference in time to surgery between the three groups (Chi-square test, $p = 0.05$).

The proportion of patients who were administered anaesthetic by a consultant grade anaesthetist was significantly different (Chi-square test, $p = 0.004$) between the groups (79% of patients were administered anesthesia by a consultant in group CNB vs. 86% and 87% of patients in groups GA and GARA respectively). A significantly lower proportion (Chi-square test, $p = 0.02$) of consultant grade surgeons performed surgeries in Group GA than in the other groups (28% consultant surgeons performed surgeries in Group GA vs. 38% and 35% in Groups GARA and CNB, respectively). There was a statistically significant difference in the type of implants used in the three groups (Chi-square test, $p = 0.04$). There was a higher proportion of cannulated hip screw/dynamic hip screw fixation noted in Group CNB (44%) than in Groups GA (34%) and GARA (37%). There was a lower proportion of intramedullary fixation used in Group CNB (10%) than in Groups GA (17%) and GARA (15%).

The hospital LOS was not significantly different between the three groups (Kruskal–Wallis test, $p = 0.30$). All parameters collected with the exception of LOS were included in a multivariate logistic regression analysis using TTFM as the dependant variable dichotomised to mobilisation within 24 hours and after 24 hours. This showed that even after controlling for confounding factors, there was still no difference in TTFM after surgery between the three anaesthetic groups ($p = 0.45$).

There was no difference found in the prescription of regular and rescue analgesia between the three groups (Table 4). The

Table 4
Comparison of regular and rescue analgesia between groups

Characteristic	Study groups			*p*
	Group GA ($n = 264$)	Group GARA ($n = 322$)	Group CNB ($n = 454$)	
Paracetamol + codeine derivatives	156 (59.1)	193 (59.9)	277 (61)	0.87 (CS)
Paracetamol + tramadol	95 (36%)	103 (32)	154 (33.9)	0.60 (CS)
NSAIDs	12 (4.6%)	10 (3.1)	22 (4.9)	0.47 (CS)
Rescue analgesia prescribed*	238 (90.2%)	287 (89.1)	418 (92.1)	0.36 (CS)
Rescue analgesia administered†	29 (11%)	32 (9.9)	54 (11.9)	0.69 (CS)

NSAIDs = non-steroidal anti-inflammatory drugs.
Data are presented as *n* (%).

administration and requirement of rescue analgesia was also similar between the three groups ($p = 0.69$).

Discussion

This study included 1040 consecutive patients who underwent hip fracture surgery at our institution over a period of 26 months. The findings indicated that the commonly employed anaesthesia techniques of GA (with or without RA) and CNB did not influence TTFM after hip fracture surgery. Patients in each anaesthetic group were well matched for age, sex, pre-injury residential status, and the number of comorbidities. Differences noted between the groups were considered confounding factors and included in a multivariate logistic regression analysis in order to control for their effect. This showed that even after controlling for confounding factors, there was still no difference in TTFM between the three anaesthetic groups. The requirement of morphine-based rescue analgesia was not different between patients who received GA (with or without RA) and CNB.

The British Orthopaedic Association (BOA)[4] recommends that patients with hip fracture should be mobilised out of bed as soon as possible and full weight bearing could be started the day following surgery.[4] The BOA recommendation is supported by NICE[1] which defines ambulation following hip fracture surgery as re-establishing the ability to move between postures and recommends that unless medically or surgically contraindicated, all hip fracture patients should be mobilised on the day following surgery.[1] In our hospital, all patients following hip fracture surgery are mobilised as per a locally-developed protocol in line with national guidance.

In comparison with GA, RA is attributed with lower mortality and morbidity, including deep vein thrombosis and postoperative confusion following hip fracture surgery.[17,18] However, a prospective observational study did not show any difference on mobilisation and LOS after hip fracture surgery in patients randomised to receive either spinal or GA.[19] It should be noted that there is no recently published study that specifically evaluated the influence of anaesthesia on postoperative mobilisation after hip fracture surgery. A systematic review on the effect of anaesthesia technique on mobilisation following elective total hip arthroplasty suggests that in comparison to GA (with systemic analgesia), CNB anaesthesia does not influence postoperative mobilisation after total hip arthroplasty.[20] Our study affirms that the lack of influence of anaesthesia technique on postoperative mobilisation following elective total hip arthroplasty extends to patients with hip fracture surgery as well. However, it should be noted that the referred systematic review[23] did show that regional anaesthesia was associated with improved analgesia reflected by reduced pain scores and morphine consumption among those who received either epidural or nerve block for postoperative pain relief. A randomised double blind placebo controlled trial showed that although epidural analgesia provides superior postoperative analgesia after hip fracture surgery, this did not translate into enhanced rehabilitation.[21] Authors of a recent Cochrane review[15] arrived at the same conclusion that although peripheral nerve blocks provide better analgesia and reduces morphine consumption, better analgesia did not translate into enhanced rehabilitation.[15] A subgroup analysis of patients in our study showed that there was no difference in TTFM between patients who received sedation during spinal anaesthesia and those who did not. It could be argued that pain may not be the main factor influencing postoperative mobilisation, and it is possible that other factors, such as patients' general health, comorbidities, haemodynamic status, and rigorous application of physiotherapy protocols, may be more relevant. Therefore, further studies looking into reasons for delayed mobilisation are warranted.

It has been shown that intravenous paracetamol can be as effective as femoral nerve block or morphine for postoperative pain following hip fracture surgery.[22] In our unit, patients with hip fracture receive a standardised postoperative analgesia regimen as per a locally-developed protocol that includes a combination of regular paracetamol and a weak opioid (codeine/dihydrocodeine) or tramadol. Regular analgesia at our institution is supplemented with strong oral opioids (oxycodone or morphine) as rescue analgesia for breakthrough pain, whereas parenteral opioids are strongly discouraged. Our postoperative analgesia protocol is reflective of NICE recommendations although it was developed before the guidance was published. A survey of UK-based anaesthetists showed that < 30% of anaesthetists usually prescribe paracetamol in combination with codeine as regular analgesia.[23] Our data shows that the majority of patients were prescribed either a combination of paracetamol and codeine/dihydrocodeine or paracetamol and tramadol as regular analgesia. Although we did not collect data regarding postoperative pain scores in our patients, the requirement of morphine-based rescue analgesia could be considered a surrogate marker of the quality of analgesia. Our data shows that postoperative rescue analgesia requirement was the same in each anaesthesia group. The use of NSAIDs has been discouraged by NICE,[1] BOA,[4] and Association of Anaesthetists of Great Britain and Ireland,[11] and this is reflected in our results. Most patients were prescribed NSAIDs because they were taking these preoperatively for a variety of reasons. We can safely infer from our results that a standardised analgesia regimen could be more effective in providing good quality analgesia and that paracetamol should be regarded as a primary analgesic intervention for patients with hip fracture. Considering that rescue analgesia requirement remained the same in each group, it appears that nerve blocks do not offer additional analgesia benefits over regular analgesia regimen, including paracetamol and a weak opioid (codeine) or tramadol.

Our study involved some limitations. Firstly, we used non-randomised observational data, which means patients did not receive general or neuraxial anaesthesia at random rather were influenced by patients' choice and clinical need. This could have led to population bias, with the possibility of patient with chest infection more likely to receive neuraxial anaesthesia. However, we attempted to overcome this population bias by including a relatively large sample size and using a rigorous protocol for collecting data on consecutive patients and finally using robust statistical analysis (ANCOVA = analysis of covariance) to control for the effect of confounding factors by including all variables that may influence mobilisation into a multivariate analysis. Secondly, considering that it is a single centre study, our finding could not be

generalised. As we have already mentioned, rigorous physiotherapy protocol and standardised analgesia regimen may have more influence on TTFM than the type of anaesthesia and pre-existing comorbidities.

Our study attempted to evaluate the influence of anaesthesia on mobilisation following hip fracture surgery. Although our data shows that anaesthetic technique does not influence operation to first mobilisation time, we acknowledge that since it is based on observational data, our findings need to be confirmed through a randomised control trial. Our data also suggests that prescription of regular postoperative analgesia is effective and morphine-based rescue analgesia requirement is the same for patients undergoing different types of anaesthetic for hip fracture surgery.

Conflicts of interest

The authors have no conflicts of interest to declare.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.jotr.2016.05.001.

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