Knee Surg Sports Traumatol Arthrosc (2013) 21:1510–1515
DOI 10.1007/s00167-012-2149-5

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Patient recall of surgical information after day case knee arthroscopy

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Received: 29 November 2011 / Accepted: 19 July 2012 / Published online: 2 August 2012

Abstract
Purpose Day case knee arthroscopy is frequently performed on dedicated lists designed to optimise the throughput of patients. This could affect patient recall of clinical information with clinical, ethical and medicolegal consequences. The purpose of this study was to assess patient recall after knee arthroscopy and identify potential contributory factors.
Methods Seventy-two patients undergoing day case knee arthroscopy were provided with information about their surgery post-operatively and tested for recall of the information prior to discharge. All patients underwent cognitive assessment when information was delivered and again when tested. Patient recall was correlated with demographic and anaesthetic factors and a multivariate regression model was used to identify risk factors for reduced recall.
Results Recall overall was poor. Significant independent risk factors for reduced recall were reduced cognitive state at the time of information delivery and a shorter time between surgery and information delivery. Duration of anaesthesia, use of sedatives and use of opiate analgesia were not significantly correlated with recall.
Conclusions Information recall after day case knee arthroscopy may be suboptimal. Allowing more time between surgery and information delivery may improve recall. However, this may be difficult during the course of a busy list and surgeons should consider using additional techniques to improve patient recall after surgery to reduce the risk of patient anxiety or non-compliance.
Level of evidence IV.

Keywords Knee arthroscopy · Memory · Recall

Introduction

Day case knee arthroscopy on a dedicated operating list is a common practice, intended to improve efficiency and throughput. This may entail early assessment of appropriate patients and anaesthetic review on the day of surgery, safely streamlining the process of admission [2, 23]. However, the disadvantage of such efficiency is that the operating surgeon needs to pre-operatively review and post-operatively discuss the findings of surgery with a large number of patients in a limited time. Patients' recall of diagnosis and risk-reduction advice is thought to be poor in general [16, 20] and may be adversely affected by anaesthetic or sedation [12]. However, this effect has not been well-described in the orthopaedic literature, and the perioperative factors influencing patient recall have not been clearly identified. Identifying such factors could allow practice modification to optimise patient recall, thus reducing clinical and medicolegal risk. Therefore, the aim of this study was to quantify patient recall of surgical information conveyed after knee arthroscopy on a busy day

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case operating list and, if possible, identify influential factors which affect patient recall of this information. The hypothesis of the study was that post-operative recall under these circumstances would be sub-optimal but identification of influential factors would potentially provide an initial evidence base for practice improvement.

Materials and methods

Seventy-five adult patients undergoing unilateral day case knee arthroscopy on an all-day dedicated knee arthroscopy list in a single theatre in a teaching hospital were prospectively studied. One of three surgeons (RDA, AB, HP) operated on all patients and one of two observers (JN, JL) performed the patient assessments and collected data. All patients gave written, informed consent to be included in the study on the day of surgery and were therefore aware that they were going to be "tested" post-operatively. Three patients were excluded (one due to a history of brain injury, one due to a history of epilepsy and one due to insufficient data), leaving 72 patients for study. Exclusion criteria included sequential bilateral procedures, a history of altered neurology, altered cognitive function, brain injury or any condition that could adversely affect memory. All patients were 18 years of age or older and no patients had ligament reconstruction. All patients had general anaesthesia with intravenous propofol infusion or a combination of intravenous propofol and inhaled sevoflurane. Neuraxial anaesthesia and regional nerve blocks were not used. All patients were clinically assessed pre-operatively by the surgeon, the anaesthetist and the ward nurse and post-operatively by the surgeon, a physiotherapist and the ward nurse. After surgery, patients were reviewed by the operating surgeon between subsequent cases, which reflects standard practice in our unit. The abbreviated mental test (AMT) [8] was performed pre-operatively to confirm normal cognitive function. Although primarily designed to detect dementia in the elderly, this scale is commonly used to quickly assess cognitive function. Alertness and comfort were assessed with the Alert/Voice/Pain/Unresponsive score (AVPU) and a ten point Likert-type pain scale, respectively. The AVPU is a validated variant of the Glasgow coma scale and is widely used in intensive care and emergency departments to quickly assess conscious level. It has good correlation with the Glasgow coma scale but is easier to administer [11, 13]. Cognitive function was assessed with the AMT and the Richmond agitation and sedation scale (RASS), which is a ten point scale used to assess and monitor sedation or agitation in an inpatient setting. These scales were used since they are validated, in common use and easy to administer [4, 9, 21]. A detailed summary of these scales is presented in "Appendix". Having established sedation and pain levels with these scales, the patient was verbally informed of the intra-operative findings by the treating surgeon and specific reference was made to three categories: the condition of the articular cartilage, status of the menisci and future management (specifically, the post-operative weight-bearing status and plan for review in the outpatient department six weeks after surgery). Stylistically, information was delivered at the discretion of the surgeon without a didactic script, but standardised terminology was used for the description of each category in turn (cartilage, meniscus, future treatment) and each category was addressed in a systematic order. For example, cartilage was described as "good" or "worn" with descriptors such as "moderately" or "badly" as required. The meniscus, for example, was described as "torn" or "intact". The patient was asked to confirm that the information was understood but formal testing was not undertaken at this stage. The information was recorded verbatim by an observer. The time from extubation to the surgeon's review (time to information delivery in minutes) was recorded, together with type of anaesthesia (inhaled, intravenous or both), duration of anaesthesia in minutes, intra-operative opiate analgesia (micrograms of fentanyl) and use of additional sedation (milligrams of midazolam). These parameters were all considered as potential sources for memory alteration. Prior to discharge, all patients were re-assessed by the same observer. AMT, pain score, AVPU and RASS were repeated. Patients were questioned about each category of information delivery (state of the articular cartilage, status of the menisci, future management) in the same category order as the information had been delivered. In addition, patients were questioned on a fourth category: whether they could recall the surgeon's post-operative consultation at all. Answers were recorded verbatim and compared to the surgeon's information to generate a score reflecting the accuracy of recall. Recall was scored from a minimum of zero to a maximum of four (one point for each category) based on the patient's dichotomous (remembered or did not remember) recall of four points: the state of the articular cartilage (for example "worn" or "damaged"), the state of the menisci (as for cartilage), future management (recall of weight-bearing status and plan for future appointment) and whether the patient remembered being visited by the surgeon. Correct answers were not required to be correct verbatim but had to agree in principle with the original information. For example, when describing articular cartilage, "worn" could be an acceptable substitute for "damaged" but not "fine" or "good". All patients were reviewed before discharge by a physiotherapist who was aware of the operative findings and no information was withheld or restricted. After review of interim data during the study, it was apparent that overall recall scores were generally low. Therefore, to assess whether a simple

intervention in the form of verbal reinforcement could improve recall, the final 27 patients in the study group were re-assessed. Immediately prior to discharge, the intra-operative findings were re-explained by the assessor and the features of the recall scale as they related to the patient were verbally reinforced for a second time, point by point. These patients were contacted telephonically 24 h post-discharge and the recall test was re-administered for comparison. However, since this subgroup analysis was not part of the original study design, an a priori sample size calculation was not performed and a post hoc power calculation showed that the subset of 27 re-tested patients was too small to yield a statistically valid result regarding the effect of verbal reinforcement ($\beta = 0.5$). Therefore, this variable did not contribute to the results.

Statistical analysis

Sample size was based on an estimate of 60–85 patients being required for a linear regression model to detect a moderate effect with three to five predictors (independent variables) with significance set at $P \leq 0.05$ [5, 15]. Demographic and anaesthetic variables, as well as time to delivery of information, time to recall and cognitive assessments at both time points, were correlated with recall scores using Spearman's rank correlation. Variables significantly correlated with recall were used to construct a forced entry multivariate linear regression model with variables entered in order of their effect size. Variables found not to be significant independent predictors of recall after controlling for the other variables were excluded in the final model. Models were carefully checked for satisfaction of assumptions governing regression. Differences in cognitive scores between groups were compared with the Mann–Whitney U test. Differences between surgeons were compared with the Kruskal–Wallis test. Significance was assumed at $P \leq 0.05$. The recall scale was tested with Cronbach's alpha and found to have good internal reliability ($\alpha = 0.75$). Data were analysed with SPSS Statistics v17 (IBM, Armonk, NY, USA).

Results

Patient demographics are summarised in Fig. 1. Anaesthetic variables, mean recall scores and time to information delivery and recall testing are summarised in Table 1. Thirteen patients (18.1 %) did not recall seeing the surgeon post-operatively at all. Twenty-nine patients (40.3 %) did not recall the plan for future management. There was no significant difference in the recall scores between men and women ($P = 0.7$) or between patients operated on by different surgeons ($P = 0.6$). A correlation table used to identify variables significantly correlated to recall scores is shown in Table 2. The final multivariate regression model was significant ($P < 0.001$) and showed (in decreasing order of their effect on the model) that only the RASS at time of information delivery, the time from surgery to information delivery and post-operative AMT were significant individual predictors of recall scores, accounting for 40 % of the variance in scores ($R^2 = 0.40$, $P < 0.001$).

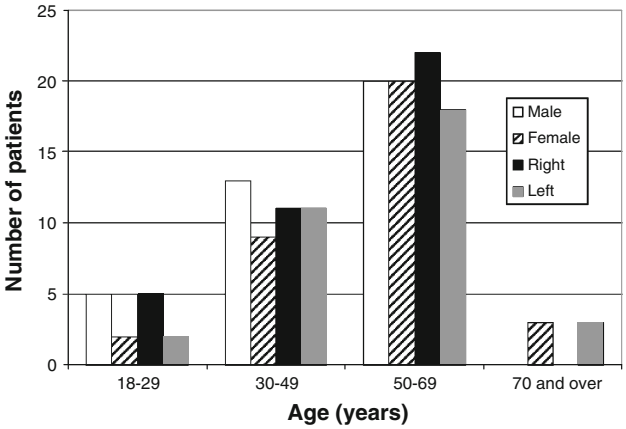

Fig. 1 Histogram showing patient age, gender distribution and side of surgery

Discussion

The most important finding of this study is that patients undergoing day case knee arthroscopy on a busy operating list have limited recall of the surgical information conveyed to them after surgery. The most influential factors affecting recall in this study were the cognitive state of the patient at the time of information delivery and the time elapsed between surgery and information delivery. Information recall therefore improves with better cognition (less sedation) and more time to recover between extubation and receiving information. Reduced post-operative cognition is consistent with the effects of benzodiazepine sedatives such as midazolam and volatile inhalants such as sevoflurane, which act at γ-aminobutyric acid type A ($GABA_A$) receptors and cause amnesia in addition to sedation [7]. Since these drugs impair learning and memory of information presented after their administration, cognition and recall improve as the time to delivery of information increases, which was confirmed by the model data. Type of anaesthesia, use of sedatives and opiate analgesia did not correlate with recall, which suggests that the time to information delivery is a more promising modifiable factor to improve information retention in practice. Provision of written material is a potential solution that has been shown to improve recall, knowledge levels, compliance and overall satisfaction with treatment [3, 6, 10, 14]. Repetition

Table 1 Recall, timing and anaesthetic variables

Mean recall score (±SD)	2.2 (±1.3)
Mean time to information delivery (min ± SD)	35.1 (±21.8)
Mean time to recall testing (min ± SD)	97.3 (±35.9)
Mean duration of anaesthesia (min ± SD)	50 (±13.9)
Type of anaesthesia	
Intravenous only	10 (13.9 %)
Intravenous and inhalant	62 (86.1 %)
Midazolam dose	
None	44 (61.1 %)
1–2 mg	28 (38.9 %)
Fentanyl dose	
None	12 (16.7 %)
≤100 μg	50 (69.4 %)
>100 μg	10 (13.9 %)
Mean AMT[a] (±SD)	
Pre-operative	
Postoperative	9.2 (±0.9)
Median pain score (range)	9.6 (±0.7)
At information delivery	3 (0–9)
At time of recall	3 (0–9)
Mean RASS[b] (±SD)	
At information delivery	1.8 (±0.5)
At time of recall	2 (±0.1)

[a] Abbreviated mental test

[b] Richmond Agitation and Sedation Scale

Table 2 Results of variable correlation with recall scores (non-significant correlates indicated with "NS", significance assumed at $P \leq 0.05$)

Variables of interest	Correlation co-efficient[a]	*P* value
Gender	0.05	NS
Age	0.06	NS
ASA	−0.01	NS
Side	0.12	NS
Duration of anaesthesia	−0.15	NS
Midazolam	−0.07	NS
Intra-operative opiate analgesia	−0.18	NS
Post-operative opiate analgesia	−0.11	NS
Time to information	0.39	0.001
Time to recall from delivery	−0.03	NS
Time of day of surgery	−0.03	NS
Pre-operative AMT[b]	0.03	NS
Post-operative AMT[b]	0.31	0.008
Pain score at information delivery	−0.09	NS
Pain score at recall	0.05	NS
RASS[c] at information delivery	0.47	<0.001
RASS[c] score at recall	0.11	NS
AVPU[d] at information delivery	−0.36	0.002
AVPU[d] at recall	−0.11	NS

[a] Spearman's rho

[b] Abbreviated mental test

[c] Richmond Agitation and Sedation Scale

[d] Alert/Voice/Pain/Unresponsive Scale

of information and testing the patient until the information is correctly recalled also improve recall ability [24] but this may not be viable in a busy, high turnover environment such as a day case operating list. Innovative modes of information delivery, such as audiovisual or pictorial aids, do not always improve recall or comprehension in comparison with written material [1, 12] but the effect may be improved by giving relevant information sooner in the patient pathway. For example, video information presented pre-operatively as part of the informed consent process may improve patients' comprehension of their pathology and treatment [19]. This technique may be particularly useful for patients with lower educational levels or limited medical knowledge. The presence of a friend or relative may be useful to the patient at any stage, although there is little evidence in the literature to confirm this [22]. At the time of surgery, local or neuraxial anaesthesia may allow live video demonstration of the surgery itself, further reinforcing relevant clinical information [18, 25]. However, this may not be acceptable to all patients and local or neuraxial anaesthesia could affect list turnover. There are several limitations to this study. Lack of a control group not undergoing surgery is a disadvantage. However, our aim was not only to investigate the effect of surgery on memory, but potentially modifiable factors in a specific orthopaedic population. In particular, we sought to investigate the potential effects of a busy list with significant timing issues and we felt this would be extremely difficult to replicate in a sample not actually undergoing the surgery. Another weakness was not formally re-testing patients at the time of information delivery to confirm immediate recollection of the information. However, this was omitted since formal re-testing does not reflect standard practice and, more importantly, the re-testing process itself may improve recall, which could have biased the results [16]. Although the post-operative information was not delivered in a scripted manner, delivery was standardised as described in the methods section. This allowed reproducible, systematic information delivery in a manner similar to that used in day-to-day practice. The findings of this study are clinically relevant because sub-optimal recall could inadvertently lead to an adverse outcome. Patients who correctly recall (and understand) their diagnosis are more likely to comply with treatment [17] and therefore reduce this risk. In addition, this study has identified time to information delivery as a

surgically modifiable factor to improve recall in day-to-day practice.

Conclusion

This study confirms that patients' post-operative recall after day case knee arthroscopy is sub-optimal and surgeons should be aware of this when conveying their findings to the patient. The key predictors for poor recall are sedation and insufficient recovery time before receiving information and surgeons should allow as much time as possible for patient recovery before conveying information. Many techniques have been described to help surgeons improve patient recall, and we recommend that these be considered when utilising a day case knee arthroscopy list. Further research is justified to assess which interventions are most likely to improve information recall in a practical, cost-effective manner.

Appendix

Abbreviated mental test score

Each correctly answered question scores one point, a score <6 suggests dementia.

1. Age.
2. Time (to the nearest hour).
3. An address (for example 42 West Street) told to the patient and to be repeated by the patient at the end of the test.
4. Year.
5. Name of hospital.
6. Recognition of two people (for example doctor and nurse).
7. Date of birth.
8. Year first world war started.
9. Name of present monarch.
10. Count backwards from 20 to 1.

Alert/voice/pain/unresponsive (AVPU) score

A: Alert
V: Responds to voice
P: Responds to pain
U: Unresponsive

Richmond Agitation and Sedation Scale

+4: Combative violent, immediate danger to staff
+3: Very agitated pulls or removes tube(s) or catheter(s), aggressive
+2: Agitated, frequent non-purposeful movement, fights ventilator
+1: Restless, anxious but movements not aggressive or vigorous
0: Alert and calm
−1: Drowsy not fully alert but has sustained eye opening/eye contact to voice (>10 s)
−2: Light sedation, briefly awakens with eye contact to voice (<10 s)
−3: Moderate sedation, movement or eye opening to voice but no eye contact
−4: Deep sedation, no response to voice but movement or eye opening to physical stimulation
−5: Unrousable, no response to voice or physical stimulation

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