

Anaesthesia practice in Denmark for relocation of the dislocated hip after total hip arthroplasty

Christine P. Holler¹, Nicolai Lohse² & Nicolai B. Foss³

ABSTRACT

INTRODUCTION: The prevalence of hip dislocations after total hip arthroplasty (THA) is 2-4% in Denmark. Patients with a dislocated THA are often elderly citizens with comorbidities and severe pain in the pre-reposition phase. Evidence as to which method of anaesthesia and airway management is best for hip relocation is lacking. The aim of this study was to determine how anaesthesiologists in Denmark provide anaesthesia for relocation of THAs, and if a local guideline is available.

METHODS: A questionnaire was distributed by e-mail to all members of the Danish Association of Anaesthesiology and Intensive Care and the Danish Society of Young Anaesthesiologists.

RESULTS: A total of 480 doctors completed the questionnaire. Of these, 61% (291/480) worked at a department providing anaesthesia for relocation of THAs of whom 85% (248/291) had provided anaesthesia during at least one hip dislocation during the past two years. A total of 27% (67/248) had access to a local guideline of whom 72% (48/67) followed the guideline. In all, 55% (134/248) preferred the patient to be fasting before anaesthesia. The preferred methods of anaesthesia were general anaesthesia with laryngeal mask 43% (106/248) and endotracheal intubation 45% (112/248). Five percent (12/248) had experienced complications to anaesthesia. Cardiovascular complications and aspiration were the most frequently reported complications.

CONCLUSIONS: Provision of anaesthesia for relocation of a dislocated THA varies across Denmark. Few anaesthesiologists have access to a local guideline.

FUNDING: none.

TRIAL REGISTRATION: not relevant.

In the years 1995-2014, a total of 139,525 total hip arthroplasty (THA) procedures and 22,218 hip revisions were performed in Denmark, corresponding to 7,343 THA/year and 1,169 hip revisions/year. The incidence of THA has increased from 101 per 100,000 persons in the population in 1996 to 165 per 100,000 population in 2014, which for some part can be explained by the growing number of elderly people in our society [1, 2].

The share of THA that subsequently dislocate is 2-4%. Three quarters of all dislocations take place within the first year after surgery [1, 2]. Hip dislocation can be

accompanied by extreme pain, risk of neurovascular and osseous injury and, with recurring dislocation, worsening of quality of life [3, 4]. The treatment for hip dislocation is closed relocation, usually carried out in analgesedation. If the hip cannot be repositioned under sedation, it may be necessary to carry out the procedure in general anaesthesia and to use a neuromuscular blocking agent. Open reposition is a last option for relocation. Patients with a dislocated hip arthroplasty suffer from severe pain and are often administered opioids in the pre-relocation phase. They are typically elderly citizens with multiple comorbidities who are at increased risk of perianaesthetic complications [5].

There is a lack of evidence as to which method of anaesthesia and airway management is optimal for hip relocations in the operating theatre. A Scandinavian guideline for general anaesthesia for emergency procedure is the closest available guideline [6]. The choice of anaesthesia for hip relocation is often sedation with the patient breathing spontaneously or general anaesthesia with or without intubation. We hypothesised that the way of performing anaesthesia for relocation of the dislocated varies much in Danish healthcare. We conducted a questionnaire survey to explore how anaesthesiologists in Danish hospitals provide anaesthesia for hip relocation, and whether a local guideline for the procedure is available. Using our results, we aimed to assess if further studies were needed to clarify which method was the best.

METHODS

A questionnaire with seventeen questions was developed in Danish. Five independent anaesthesiologists critically revised the questionnaire. An English version was developed by an independent anaesthesiologist who is a native speaker of English and fluent in Danish. The English version was backward translated into Danish by another anaesthesiologist. No discrepancies were found between the backward translation and the original. In March 2015, the questionnaire was distributed by email to all members of the Danish Association of Anaesthesiology and Intensive Care (DASAIM) (n = 1,060) and the Danish Society of Young Anaesthesiologist (FYA) (n = 750). The questionnaire contained open-ended and closed-ended questions. The respondents were asked to

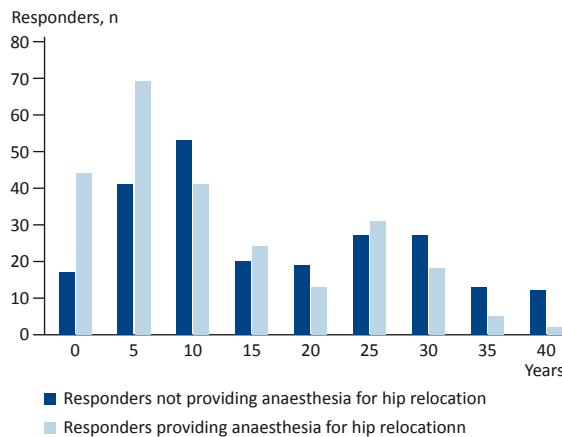
ORIGINAL ARTICLE

1) Department of Anaesthesiology and Intensive Care Medicine, Herlev Hospital
2) Department of Anaesthesiology, Centre of Head and Orthopaedics 4231, Rigshospitalet
3) Department of Anaesthesiology and Intensive Care Medicine, Hvidovre Hospital, Denmark

Dan Med J
2018;65(5):A5480

FIGURE 1

Years since graduation.


TABLE 1

Presence of a local guideline among anaesthesiologists.

	n /N (%)
Have a local guideline	67/248 (27.0)
Do not have a local guideline	83/248 (33.5)
Unaware if a local guideline exists	94/248 (37.9)
Guideline updated within 3 yrs	37/67 (55.2)
Follows the local guideline	48/67 (71.7)

indicate their level of experience, if a local guideline was available and whether or not they followed the guideline. Furthermore, the questionnaire included questions regarding choice of anaesthesia method, fasting rules and complications related to the choice of anaesthesia.

The questionnaire was discontinued if the responders did not work at a department providing anaesthesia care for hip relocation. The survey was answered anonymously.

Data were analysed using descriptive methods with prevalence proportions for all categorical data and median (interquartile range) for continuous variables. Data were analysed using Stata Statistical software version 13.1 (StataCorp, 4905 Lakeway Drive, Collage Station, Texas, USA). Approval from the Danish Data Protection Agency and the National Scientific Committee was not required as the study involved no person-identifiable data, patient sensible data or patient contact.

Trial registration: not relevant.

RESULTS

A total of 520 persons responded to the online questionnaire, corresponding to a response rate of 29.0%

(520/1,810). In all, 40 of these persons were excluded because the questionnaire had not been completed. Thus, 480 (92.0%) anaesthesiologists from 33 hospitals in Denmark responded to the questionnaire. Hereof 39.2% (188/480) served at a university hospital. Furthermore, 62.7% (300/480) of the respondents were male. In all, 60.6% (291/480) worked at a department providing anaesthesia for hip reduction. Of these, 85.0% (248/291) had anaesthetised at least one patient during the past two years and were included for further analysis regarding guidelines and method of anaesthesia.

Years since graduation from medical school is presented in **Figure 1**. The respondents who had provided anaesthesia for hip relocation had a median of ten years of experience (range: 1-43 years) and 55% were specialists. Respondents who did not provide anaesthesia for the procedure had a median of 15 years (range: 0-50 years) of experience and 74% were specialists.

The availability of local guidelines among anaesthesiologists providing anaesthesia for hip relocation is summarised in **Table 1**.

Before providing anaesthesia, 54.0% (134/248) of the respondents required the patients to be fasting. A total of 38.7% (96/248) would not wait for the patient to be fasting (7.3% missing or "others"). Furthermore, 45.2% (112/248) provided general anaesthesia with an endotracheal tube and 42.7% (106/248) used general anaesthesia with mask ventilation (see **Table 2**). If intubation was necessary, 77.4% of respondents would use rapid sequence intubation.

In patients who were sedated or under general anaesthesia with mask ventilation, and where a neuromuscular blocking agent had to be provided to facilitate hip relocation, 42.7% (106/248) of the respondents would continue the procedure without securing the airway with an endotracheal tube. For 27.0% (67/248) of the respondents, the choice of anaesthesia was not at all influenced by the surgeon's opinion.

Five percent (12/248) had experienced complications. A total of 22 episodes were reported among the 12 anaesthesiologists who had experienced complica-

TABLE 2

Method of anaesthesia.

	n (%) (N = 248)
General anaesthesia and intubation	112 (45.2)
General anaesthesia and laryngeal mask	5 (2.0)
General anaesthesia and mask ventilation	106 (42.7)
Sedation	7 (2.8)
Neuroaxial block	2 (0.8)
Peripheral nerve block	1 (0.4)
Missing data	15 (6.1)



TABLE 3

Complications reported.

Method of anaesthesia	Complication, n						
	cardiovascular ^a	hypoxia ^b	aspiration	unexpected airway problems	respiratory arrest	death	other
General anaesthesia + intubation	6	2	1	3	-	-	2
General anaesthesia + laryngeal mask	1	1	-	-	-	-	-
General anaesthesia + mask ventilation	-	-	1	-	-	-	-
Sedation	-	-	1	-	1	-	-
Neuroaxial block	-	-	1	-	-	-	-
Peripheral nerve block	1	-	1	-	-	-	-

a) Arrhythmia, hypotension, ischaemia.

b) Saturation < 80%.

tions, with cardiovascular complications being the most reported (eight times) followed by aspiration (five times) (see **Table 3**).

DISCUSSION

Among 480 Danish anaesthesiologists who provide anaesthesia for hip relocation, we found a low availability of local guidelines, a wide variation in the way of providing anaesthesia for the procedure and a number of anaesthesiologists who had experienced complications.

The strengths of our study were the nationwide design and the fact that data were collected from the anaesthesia providers themselves and not from clinic or hospital managements. This study is the first to examine how anaesthesia is provided for relocation of a dislocated THA in the operating theatre. The study also had some limitations. The response rate was rather low, which was expected. The DASAIM and the FYA have considerable overlap between members of the association, and colleagues who are not working as anaesthesiologists can still be members (retired, working in the private sector or students).

Selection bias might have been introduced if responders differed from non-responders. The actual number of complications might be higher or lower than reported in this questionnaire as the respondents had to reply only if they had encountered complications and which ones they had experienced. They were not asked to provide the number of times they had experienced each complication. Furthermore, the quality of the data might be affected by recall bias as answers are determined by the respondent's ability to recall past experiences.

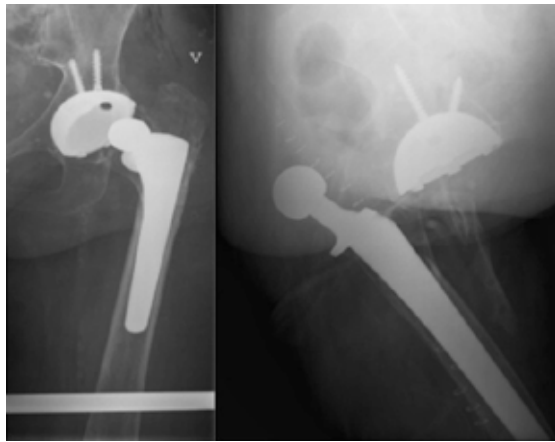
Several studies in the emergency medicine literature have examined complications related to relocation of the dislocated hip carried out in sedation in the emergency department by emergency staff [7-9]. A clinical guideline for sedation specifically in the emergency de-

partment has been developed by American researchers [10]. However, no studies have so far explored the complications related to the different methods of providing anaesthesia by anaesthesiologists in the operating theatre. Furthermore, neither national nor international guideline exist; nor do large-scale safety data for either setting.

Our findings of non-uniformity in the way patients were anaesthetised could partly be explained by participation of less experienced anaesthesiologists in this study, the low availability of local guidelines and the inter-hospital variation regarding awareness of a present guideline. These results correspond to the findings of a study by Francke et al and Lugtenberg et al [11, 12]. They investigated why physicians did not follow clinical recommendations. One factor was age and experience. The less experienced physicians would follow guidelines more thoroughly than the more experienced ones. Another factor was lack of agreement with the guideline, work pressure or limited time and personal resources. This may cause variation in practice, inefficient practice and jeopardise safe patient outcome [13]. In our study, one quarter of the respondents did not follow the available guidelines.

We did not explore the reasons for not following guidelines, but the factors explored by Francke et al and Lugtenberg et al can probably be applied to the Danish anaesthetists as well, and may explain the diversity in anaesthesia practice and why the local guidelines were not followed. Furthermore, variation in practice from the local guideline might be correlated with the condition and airway assessment of the patient.

Three other studies found that sedation was associated with an increased risk for cardiovascular and respiratory complications. This risk has been found to reach 6-12% and is significantly increased with the need for deeper sedation [7-9]. The most frequent complications reported in this questionnaire were cardiovascular and



Dislocation of a total hip arthroplasty.

respiratory complications (20/22). The majority of these complications were found in the “General anaesthesia and intubation” group (12/20), which corresponds to the complications reported by Jensen et al in the Scandinavian guidelines for general anaesthesia for emergency procedures [6]. When performing general anaesthesia with intubation, a higher dose of anaesthetic is given to ensure sufficient anaesthetic depth before intubation is performed. Furthermore, general anaesthesia with intubation was the preferred method of providing anaesthesia among the responders (Table 3), which can explain the rate of cardiovascular and respiratory complication.

The wait time for hip relocation can be long. A study by Gagg et al, which was carried out in five British emergency departments, found that the median time from arrival at the hospital to relocation in the operation theatre was 490 min (range: 456-1,472 min) [14]. While waiting for the procedure, patients are suffering severe pain and are often administered opioids, which potentially increases the risk of aspiration [6, 15].

Aspiration is a feared complication to anaesthesia and can be associated with increased morbidity and mortality [15-17]. In a British study by Robinson & Davidson, 50.0% of airway deaths were caused by aspiration, and aspiration was due to incomplete assessment of aspiration risk [15]. Nearly half of the respondents in our questionnaire preferred the patient with hip dislocation to be fasting before anaesthesia. It could be argued that this group of patients will never become fasting and that it has an increased risk of aspiration and should be anaesthetised according to the Scandinavian guidelines for emergency procedures [6, 15].

In this survey, 42.0% of the respondents would provide sedation or general anaesthesia with mask ventilation even though a neuromuscular blocking agent had to be used. This is a surprising finding as an unprotected airway, light anaesthesia and positive pressure ventila-

tion are some of the anaesthetic factors that significantly increase the risk for aspiration [15, 18].

Whether the present variation in anaesthesia methods represents good clinical judgement or dangerous deviations from standard anaesthesia practice cannot be answered. However, the lack of and need for data on complications and best anaesthesia methods are highlighted by the large variation in practice in this patient group.

CONCLUSIONS

We have demonstrated that there is no consensus in Denmark regarding how to provide anaesthesia for patients with hip dislocation. The procedures are mostly performed in general anaesthesia with mask ventilation or endotracheal intubation as airway management. The awareness of and presence of a local guideline is low, and inter-hospital variation in adherence to available guidelines exists. There is a need for studies that examine the risk of periprocedural complications. Future studies, preferably large retrospective studies, should include data on anaesthesia method, airway management and complications related to the anaesthesia to establish evidence-based guidelines for sedation/anaesthesia of patients with a dislocated hip.

CORRESPONDENCE: *Christine P. Holler*. E-mail: christineholler@hotmail.com

ACCEPTED: 5 March 2018

CONFLICTS OF INTEREST: none. Disclosure forms provided by the authors are available with the full text of this article at www.danmedj.dk

LITERATURE

1. Dansk Hoftealloplastik Register. National årsrapport 2015. Danish Hip Arthroplasty Register, 2015. https://www.sundhed.dk/content/cms/98/4698_dhr-aarsrapport-2015.pdf (1 May 2017).
2. Kjærsgaard-Andersen P, Varmarken J-E, Gebuhr P et al. Total hoftealloplastik. Dansk Ortopædisk Selskab og Dansk Selskab for Hofte- og Knæalloplastik, 2006. www.ortopaedi.dk/fileadmin/Guidelines/Referenceprogrammer/THA-referenceprogram.pdf (1 May 2017).
3. Germann C, Geyer D, Perron A. Closed reduction of prosthetic hip dislocation by emergency physicians. *Am J Emerg Med* 2005;23:800-5.
4. Kotwal R, Ganapathi M, John A et al. Outcome of treatment for dislocation after primary total hip replacement. *J Bone Joint Surg Br* 2009;91:321-6.
5. Hopkins TJ, Raghunathan K, Barbeito A et al. Association between ASA physical status and postoperative mortality at 48 h: a contemporary dataset analysis compared to a historical cohort. *BMC Periop Med* 2016; 5:29.
6. Jensen AG, Callesen T, Hagemo JS et al. Scandinavian clinical practice guidelines on general anaesthesia for emergency situations. *Acta Anaesthesiol Scand* 2010;54:922-50.
7. Mathieu N, Jones A, Harris A et al. Is propofol a safe and effective sedative for relocating hip prostheses? *Emerg Med J* 2009;26:37-8.
8. Dawson N, Dewar A, Gray G et al. Association between ASA grade and complication rate in patients receiving procedural sedation for relocation of dislocated hip prostheses in a UK emergency department. *Emerg Med J* 2013;0:1-3.
9. Jaques K, Dewar A, Gray A et al. Procedural sedation and analgesia in a large UK emergency department: factors associated with complications. *Emerg Med J* 2008;28:1036-40.
10. Green S, Roback J, Miner J et al. Fasting and emergency department procedural sedation and analgesia: a consensus-based clinical practice advisory. *Ann Emerg Med* 2007;49:454-61.
11. Francke A, Smit M, de Veer A et al. Factors influencing the implementation of clinical guidelines for health care professionals: a systematic meta-review. *BMC Med Inform Decis Mak* 2008;8:38.
12. Lugtenberg M, Zegers-van Schaick M, Westert G et al. Why don't physicians adhere to guideline recommendations in practice? An analysis of barriers among Dutch general practitioners. *Implement Sci* 2009;4:54.
13. Smith A, Alderson P. Guidelines in anaesthesia: support or constraint? *Br J Anaesthesia* 2012;109:1-4.

14. Gagg J, Shingler N, Bothma N et al. Door to relocation time for dislocated hip prosthesis: multicentre comparison of emergency department procedural sedation versus theatre-based general anaesthesia. *Emerg Med J* 2009;26:39-40.
15. Robinson M, Davidson A. Aspiration under anaesthesia: risk assesment and decision-making. *Contin Educ Anaesth Crit Care Pain* 2014;14:171-5.
16. Sakai R, Planinsic R, Quinlan J et al. The incidence and outcome of perioperative pulmonary aspiration in a university hospital: a 4-year retrospective analysis. *Anesth Analg* 2006;103:941-7.
17. Warner M, Warner M, Weber G. Clinical significance of pulmonary aspiration during the perioperative period. *Anesthesiology* 1993;78:56-62.
18. Asai T. Editorial II: who is at increased risk of pulmonary aspiration? *Br J Anaesth* 2004;93:497-500.