Day case surgery and incidence of transient neurological symptoms after spinal anaesthesia with prilocaine – influence on patients

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Abstract

Background: Spinal anaesthesia is a common technique for day case surgery. One major complication is the occurrence of transient neurological symptoms (TNS). The trigger mechanisms are not definitively clear. The incidence of TNS varies according to the applied local anaesthetic agent and study population. Prilocaine is known to cause a lower incidence of TNS. While symptoms appear typically within 24 hours after complete recovery, the incidence in a day case surgery population with an early discharge is difficult to obtain. The aim of our study was to evaluate the incidence and the triggering factors of TNS after spinal anaesthesia with Prilocaine 2% (70mg) in day case (ambulatory) surgery population and the impact on patients satisfaction.

Methods: We included 102 Patients between 2005 and 2008 (age 25-70yrs, 56M/46F, ASA I-II) scheduled for day case surgery. Spinal anaesthesia was standardized (Sprotte 25 gauge). All patients were discharged home without any neurological symptoms. We performed a standardized telephone interview within 7 days after surgery and recorded abnormalities.

Results: The incidence for TNS in our study population was 6.9% (7/102 Patients). All Patients with TNS were between 40-55 years old. TNS lasted for 1-3 days without permanent deficits. No difference between male and female was recorded. The duration of surgery had no influence on TNS. Post punctual headache occurred in 2 patients.

Conclusions: As previously reported the incidence of TNS after spinal anaesthesia using Prilocaine varies in a range from 0 to 4%. Our data suggest that an early mobilisation within 4 hours after surgery (day case surgery) and the use of a tourniquet could have a negative impact on the incidence of TNS, but with the restriction that our results still were within the 95% confidence interval of previous findings. The occurrence of TNS had a negative impact on the acceptance of spinal anaesthesia.

Keywords: day case surgery, Prilocaine, spinal anaesthesia, TNS.

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Introduction

An increasing number of patients are scheduled for day case surgery. Ambulatory surgery allows earlier return to preoperative physiological state, fewer complications, reduced mental and physical disability, and early resumption of normal activities [1,2]. Hospital costs are lower because ambulatory surgery is more efficient than inpatient care [3]. The patients should recover after a day case operation as quickly as possible from anaesthesia and operation. Therefore, anaesthesia procedures with short acting anesthetics are desirable. General anaesthesia is frequent considered as the standard anaesthesia procedure [4]. Hence a higher safety is required from regional anaesthesia, although it is well known that regional anaesthesia has a lower incidence of severe perioperative complications than general anaesthesia has [5,6]. Nevertheless, regional anaesthesia plays an important role for day case surgery patients. Especially spinal anaesthesia is widely common [7]. To ensure a fast recovery, short acting local anesthetic agents with fewer side effects should be used. For spinal anaesthesia in day case surgery patients Prilocaine is to be favoured [8]. Anyhow many patients fear severe complications, thus they have a certain timidity obtaining spinal anaesthesia. Irreversible neurological deficits after an unproblematic spinal anaesthesia are rarely known [9]. Temporary neurological deficits called "transient neurologic symptoms" (TNS) occur more frequent [10]. Prilocaine is known to have a low incidence for TNS [11]. A direct neurotoxicity is blamed for this findings [12,13,14]. Several triggering factors had been investigated [15]. Anyhow the exact mechanism is yet not known. TNS are mostly defined as emitting pains (aches) and/or dysaesthesia within the first 24 h after followed regional anaesthesia and have a negative impact on the patients satisfaction [16]. Patient satisfaction is one of the client-assessed outcomes and a very important component of improving the quality of healthcare. Patient satisfaction affects the outcome of healthcare and the use of healthcare services [17]. Therefore, it is important to identify the reasons and the risk factors for patient dissatisfaction. In a day case surgery population with an early discharge these late onset symptoms are hard to evaluate. The aim of study was to evaluate these symptoms and their triggering factors to improve patients satisfaction and the acceptance of spinal anaesthesia in a day case setting.

Methods

Study population

Institutial Ethics Committee approval was obtained and all the patients gave informed written consent. To create a better overview and identify adverse age influences, we had split the expected study population in three similar age groups. Following previous studies (Table 1), and to ensure appropriate power of the study, we determined a minimum study population of 30 patients in each group. Between 2005 and 2008 we included 102 ASA physical status I and II patients (Age 25–70yr, 58M/44F) scheduled for elective day case surgery. All patients included in this study agreed in spinal anaesthesia

Table 1 Prilocaine and incidence for TNS – previous data (no day case setting)

Author	Local anaesthetic agent	Incidence of TNS	Type of surgery
Hampl et al. 1998	Prilocaine 2% isobaric	1/30 (3,3%,CI 0.08-17)	Minor gynaecologic surgery
Martinez- Bourio et al. 1998	Prilocaine 5% isobaric	1/100 (1%,CI 0.03-5,5)	Mixed minor surgery
Ostgaard et al. 2000	Prilocaine 2% isobaric	2/50 (4%,CI 0.5-13.7)	Minor urological surgery
Playa et al. 2000	Prilocaine 5% isobaric	0/27 (0%,CI 0-10)	TURP
De Weert et al. 2000	Prilocaine 2% isobaric	0/34 (0%,CI 0-8.4)	Minor orthopaedic surgery
Summary of 5 Studies	**4/241 (1.6%,CI 0.5-4.2)**		

after the anaesthesia pre-operation discussion. We excluded patients from the study with a history of chronic pain, presence of neurological disease, and chronic use of analgesic medications.

All Patients were premedicated with midazolam 7.5mg (oral) 30 minutes before operation. Before spinal anesthesia was performed, 10 mL/kg of lactated Ringer's solution was administered over 20 min. Spinal anaesthesia was performed at the interstitium of L3–L4 or L4–L5 with the patient in a sitting position using a 25 G sprotte needle. In each case 70mg of Prilocaine (isobaric) were administered. The dissemination of the spinal anaesthesia was recorded through the respective dermatomes. Hypotension (systolic blood pressure <90mmHg) was treated with theodrenalin 50mg + cafedrinhydrochloride 2.5mg i.v (Akrinor®) and bradycardia was treated with 0.5 mg i.v. atropine at the discretion of the anesthesiologist. Nausea was treated with dolasetron 12.5 mg i.v. Further intraoperative sedation was provided as needed with midazolam 1 mg i.v. . Postoperatively, a basic pain management was used consisting of metamizol 500 mg i.v. and paracetamol 1 g i.v. In every patient a complete remission of the spinal block with sufficient bladder function and absence of considerable pain was ensured before discharge. After discharge from hospital the patients were managed with ibuprofen 400 mg oral 3 times/day.

Acquisition form

Data was collected retrospectively immediate after discharge including demographics, technical difficulties performing the block, any paraesthesia encountered during the performance of the block, patient position during the block, type and the duration of surgery. Within the first postoperative week, patients were interviewed by a standardized qualitative in depth interview to identify signs of TNS and the acceptance of spinal anaesthesia, according to a protocol. TNS was defined as pain and/or dysaesthesia in the area of the buttocks, thighs, or lower limbs occurring after recovery from anaesthesia. Patients with TNS were asked to rate the degree of pain, using a visual analog scale with a score of 0 - no pain to a score of 10 - worst imaginable pain. The primary outcome for this trial was the percentage of TNS and their influence on the patients' acceptance of spinal anaesthesia.

Statistic analysis

Univariate comparisons of the patients' characteristics were performed using unpaired t-test, X^2, or Fisher's exact test. The Fisher's exact test was used when the expected values in a cell were less than five. The 95% confidence intervals were used to examine potential confounders. All statistics were realised with StatView 4.57 for Windows (Abacus Software, USA).

Results

Biometric data did not differ significantly between the groups (Table 2). Relevant aspects of surgical and anesthetic procedures are provided in Table 2, and there were no statistical differences between the three groups. Neither problems with the anesthetic technique, bleeding through the needle or paraesthesia were observed in any patient. There was no difference between the groups regarding, BMI, duration of surgery, VAS scores of surgical pain at rest and movement during the postoperative period in the PACU. All patients were mobilized within four hours after surgery and could be discharged by eight hours after surgery at the latest.

Postoperative incidence of TNS

Seven patients (3F/4M) had TNS (7/102; 6.9% CI 2.8–13.6). The symptoms started within the first 24 hours after surgical procedure and were located in buttocks, thighs and lower limbs. Neurological

Table 2 Basic data of our study population.

Age 25–70(yr) Total n=102 (58M/44W)	Age 25–39(yr) n=32	Age 40–55(yr) n=38	Age 56–70 (yr) n=32
BMI Surgery time	26 (sd 4.5) 73min (sd 23)	27 (sd 4.3) 77min (sd 22)	27 (sd 5.8) 84min (sd 32)
Duration of block	157min (sd 36)	162min (sd 48)	173min (sd 35)
Intraoperative hypotension <RR sys 90mmHg	3/32 (9.4%, CI 2–25%)	1/38 (2.6%, CI 0.07–13%)	2/32 (6.2%, CI 0.7–21%)
Patients favour SPA before declaration of consent	14/32 (44%, CI 26–62%)	12/38 (31%, CI 32–49%)	15/32 (47%, CI 29–65%)
Contently with SPA	30/32 (93%, CI 79–99%)	28/38 (74%, CI 57–87%)	29/32 (90%, CI 74–98%)
Postdural puncture headache	1/32 (3%, CI 0,01–16%)	0/38 (0%, CI 0–7,6%)	1/32 (3%, CI 0,01–16%)
TNS	0/32 (0%, CI 0–9%)	7/38 (18.4%, CI 7.7–32%)	

symptoms persisted no longer than 72h. None of them had to be readmitted to hospital. All patients with TNS were located in the mid age group (age 40–55yr) (7/38, 18.4%, CI 7.7–32%, P<0.0077, Table 2). Most of the patients with TNS had an intraoperative tight tourniquet (6/7; 85% CI 42–99). Body mass indexes, duration of surgery and intraoperative hypotension's didn't have any significant impact on the occurrence of TNS.

Other postoperative complications

Postdural puncture headache occurred in two patients (2/102; 1.96% CI 0.2-6.9) and were associated in coherence with postoperative shivering (2/2; p>0.006) while absolute incidence for postoperative shivering was 3.9% (4/102; CI 1.1–9.7). None of these patients had TNS. Postoperative nausea and vomiting (PONV) was reported in four patients (4/102; 3.9% CI 1.1–9.7). There was no statistic relationship between PONV and other complications (TNS, shivering, postural puncture headache).

Acceptance of spinal anaesthesia

More than half of our population (60%, 61/102) had doubts in applying spinal anaesthesia before our premedication visit. Nevertheless 85,3% (87/102) would chose spinal anaesthesia for further surgery, but 71% (5/7) of our patients with TNS refused spinal anaesthesia for further surgery (P<0.0022). Other complications as postural puncture headache, shivering and PONV had no negative impact on the patients' acceptance of spinal anaesthesia (Table 3).

Discussion

Day case surgery challenges anaesthesia techniques. Avoiding postoperative pain, gagging on the tracheal tube, disorientation and nausea and vomiting are major priorities for day case patients [18]. Concerning these priorities, spinal anaesthesia in contrast to general anaesthesia has several advantages. Anyhow general anesthesia is considered to be the standard technique for a day case population. Only 40% (41/102 CI 30–50) of our population favored spinal anaesthesia before the declaration of consent. Nevertheless 85% (87/102, CI 77–91) would choose spinal anesthesia for further surgery (p>0.00001). The occurrence of perioperative complications had a negative impact on the acceptance of spinal anaesthesia. Whereas 90% (9/86, CI 5–19) of the patients' without complications were satisfied in spinal anaesthesia, the rate in the population with perioperative complications was significantly reduced to 37% (6/16, CI 15-64) p>0.0008. The most frequent complications were TNS (46%; 7/16, CI 19–70)

Several triggering factors for TNS were discussed. Today it is worth as saved that all local anaesthetics are directly neurotoxic in the suitable concentration [19]. However the exact mechanism is yet unknown. There are several studies indicating that mechanic stretch on nerve fibers or local ischemia (e.g. lithotomic position, tight tourniquet or supplementation with adrenaline) could increase the incidence for TNS [11,20,21]. In contrast to previous data applying prilocaine for spinal anaesthesia, we found a higher incidence for TNS in a day case surgery population (1.4% vs. 6.9%) [11,16]. This could be substantiated by an early mobilization and followed daily routine with possibly increased mechanic stretch on nerve fibers. As most of the patients' with TNS had an intraoperative tight tourniquet (6/7; 85% CI 42–99) this local ischemia could contribute to the incidence for TNS. Whether the direct neurotoxicity, mechanical stretch or a local ischemia is primary to blame for the pain sensations in the course of TNS is not definitely clear.

The pain sensations related to TNS were characterized by the patients' as a violent pain affecting their daily routine. Some authors argue that TNS did not affect patients' satisfaction [22]. However, the proportion of patients who will recommend spinal anaesthesia was higher in the non-TNS patients than in TNS patients (90% vs. 71% p>0.0022). It seems that the transitory pain and functional impairment has negative influence on the patients' decision to receive spinal anaesthesia in the future. These findings were confirmed by an epidemiologic study (Freedman 1998) with 1863 patients, 30% of the 104 patients who developed TNS after intrathecal lidocaine rated their pain as severe with a negative impact on patients' satisfaction [17].

In contrast to this, other major complications of spinal anaesthesia (post punctual headache, PONV, shivering) had no significant impact on the patients' willingness to receive spinal anaesthesia for further operations. This implies that the occurrence of TNS in a day case population has to gain in importance to improve the patients' satisfaction. Measurement of patient satisfaction with anaesthetic care is inherently difficult as it depends on a multitude of factors [19,23,24]. Hence avoiding the occurrence of TNS is a starting point to improve the acceptance of spinal anaesthesia. New short acting local anaesthetics e.g. chloroprocaine or a critical appraisal of the tourniquet use, could contribute to a lower incidence for TNS. To evaluate this for a day case surgery population further studies with a close-meshed postoperative follow up are needed.

Table 3 Postoperative complications and impact on the acceptance of spinal anaesthesia.

Age 25–70(yr) Total n=102 (58M/44W)	Discontentedly with spinal anaesthesia	p-value (fishers exact test)
TNS (7/102)	5/7	p<0.0022
Postdural puncture headache (2/102)	0/2	n.s.
Shivering (4/102)	1/4	n.s
PONV (5/102)	0/5	n.s.
Complications (16/102)	6/16	p<0.008
No complications (86/102)	9/86	p<0.008

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