Lumbar punction: comparison between an atraumatic and a traumatic punction needle

Lumbalna punkcija: primerjava netravmatske in travmatske punkcijske igle

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Ključne besede:
igla; popunkcijski glavobol (PPG); glavobol po punkciji dure

Key words:
needle; post-lumbar puncture headache; post-dural puncture headache (PDPH)

Citirajte kot/Cite as:
Zdrav Vestn. 2017; 86(1–2):53–64

Received: 23. 8. 2016
Accepted: 3. 1. 2017

Abstract

Background: Lumbar puncture is a standardized, routine diagnostic procedure in the diagnosis of neurological diseases. Post-dural puncture headache (PDPH) is a common complication which occurs in 10 to 30 % of patients. Although the incidence of PDPH is much lower with the use of small, non-cutting needles, neurologists in Slovenia routinely use the classical traumatic spinal needles.

Methods: In the article we provide an overview of a research concerned with the use of traumatic and atraumatic needles in the procedure with the emphasis on complications of the lumbar puncture. We present American and European recommendations for lumbar puncture procedure.

Conclusions: International recommendations for neurologists advise the use of atraumatic spinal needles for lumbar puncture. We recommend to Slovenian neurologists to start using the atraumatic needles for elective lumbar punctures and hence provide neurological patients with better quality and cheaper long-term care.

Izvleček

Uvod: Lumbalna punkcija je standardni, rutinski postopek pri diagnosticiranju nevroloških bolezni. Pogost zaplet lumbalne punkcije je popunkcijski glavobol (PPG), ki se pojavlja v povprečju pri 10–30 % punktiranih. Na nevroloških oddelkih v Sloveniji zaenkrat rutinsko uporabljamo klasične travmatske punkcijske igle, medtem ko je bilo z več raziskavami dokazano, da incidenco PPG zmanjšamo z uporabo netravmatskih punkcijskih igel.

Metode: V prispevku je opisan pregled do sedaj opravljenih raziskav o uporabi travmatske in netravmatske igle pri lumbalni punkciji s poudarkom na primerjavi zmanjšanja zapletov. Predstavimo ameriške in evropske smernice ter priporočila pri izvedbi lumbalne punkcije s poudarkom na uporabi različnih vrst igel. Pregledamo možnosti, ki jih imamo pri nas za izvedbo lumbalne punkcije.

Zaključki: Mednarodne smernice priporočajo nevrologom uporabo netravmatskih punkcijskih igel. Na podlagi do sedaj opravljenih mednarodnih študij predlagamo uvedbo netravmatskih igel za neurgentne lumbalne punkcije tudi pri nas, saj bomo tako nevrološkim bolnikom omogočili bolj kakovostno in na dolgi rok cenejšo oskrbo.

1. Introduction

Modern international guidelines support the use of atraumatic needles for lumbar puncture. As the diagnostic lumbar puncture in neurological patients is a frequent routine investigation, which is in our settings still performed with

traumatic needles, we hereby present a review of the literature on the use of traumatic and atraumatic needles along with the American and European guidelines and recommendations for the performance of this investigation.

2. Lumbar puncture

Lumbar puncture is a standard, routine diagnostic procedure in patients with neurological symptoms and signs. The physician, in aseptic conditions, using a special needle intended for this purpose, punctures the spinal channel – subarachnoid space, most frequently at the level of the 3rd and 4th lumbar vertebrae, and collects a sample of the cerebrospinal fluid (1). The purpose of lumbar puncture is to diagnose possible infection, inflammation, CNS disorder or a subarachnoid haemorrhage by cerebrospinal fluid examination. In the event of idiopathic intracranial hypertension, the puncture may be performed with therapeutic intent. Lumbar puncture is also used for intrathecal administration of various agents, such as antibiotics, anaesthetics, chemotherapeutic agents or radiopaque contrast media.

2.1 Historical aspects of lumbar puncture

The first lumbar puncture was performed by Walter Essex Wynter in 1889 in London, with an intent to relieve/decompress intracranial pressure in four patients with tubercular meningitis. The article was published in the first issue of the Lancet. Only two years after this first attempt in which all four patients died, in 1891 at a conference in Wiesbaden, Dr Heinrich Quincke presented a new technique of lumbar puncture (3,4) in a patient with meningitis, who had undergone three repetitions of the procedure and survived. Even today, the Quincke's traumatic needle is the most frequently used lumbar puncture needle and the procedure is also similar, the only difference being in that it is performed in aseptic conditions.

2.2 Complications and contraindications

Despite the fact that nowadays lumbar puncture represents a routine and relatively safe procedure, complications may not be fully avoided (5,6). The risk of complications is particularly high in patients with an increased intracranial pressure due to brain neoplasm, an increased risk of bleeding due to coagulation disorder: thrombocytopenia with a platelet level below 50,000–80,000/μL (7), active haemorrhage or INR >1.4 (8) or an epidural spinal abscess (9). In these patients lumbar puncture is contraindicated. By means of vigilant clinical examination, imaging diagnostics (head CT haemogramme or MR scan of the spine in the case of a spinal epidural abscess) and laboratory tests (haemogramme, INR) the risk of lumbar puncture-associated complications can be reduced, and conditions in which lumbar puncture is contraindicated can be detected. Whenever in doubt, we consult a radiologist or a haematologist (10).

A relevant factor that affects the probability of complications in lumbar puncture is the quality of the procedure, where the technique and skills of the physician performing it are of great importance. But nevertheless, complications may occur even when the procedure is performed with due diligence in adequately selected patients by a skilled physician. Among the most frequent ones are lumbago and headache, a combination of both and severe radicular pain (11). Infections, haemorrhage or spinal haematoma, herniation or intradural epidermoid cyst occur less frequently (10).

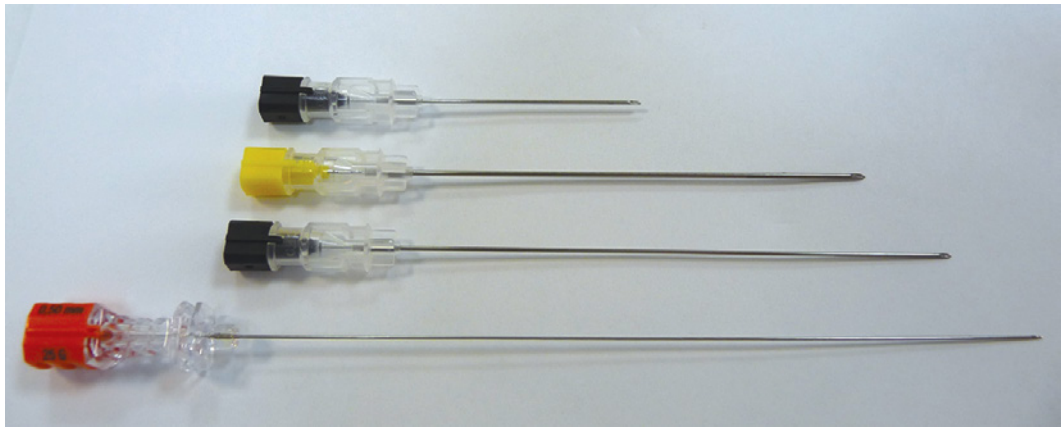


Figure 1: A Quincke type traumatic needle for lumbar puncture (top to bottom): 22-gauge with black hub, short, 38 mm; 20-gauge with yellow hub, medium, 75 mm; 22-gauge with black hub, 90 mm (standard), and in the bottom, Sprotte type atraumatic needle: 25-gauge with orange hub, long, 120 mm. The Quincke needle has a sharp bevel that advances easily through tissue planes. Source: Bregant T.

2.3 Post-lumbar puncture headache – PLPH

Some subjects, particularly younger ones, may develop a post-dural-puncture headache (PDPH) (12). Other CNS-related complications, such as complaints of double vision, tinitus and transient deafness, are considerably less frequent (13). The mechanisms of these complications have not been fully explained yet; most probably they are attributable to a decrease in the intracranial pressure as a result of cerebrospinal fluid withdrawal and leakage (12,14). This causes traction to the intracranial structures, such as the meninges, blood vessels and cranial nerves, and the associated feeling of pain. A possible compensatory reaction to intracranial hypotension is dilatation of the cerebral veins, which also may cause a headache (14).

In the International Classification of Headaches-II (ICHD-II) PDPH is defined as a postural headache that occurs within five days of the puncture. It is exacerbated with upright position, lasts at least 15 minutes and resolves after 15 minutes. In order to meet the diagnostic criteria, at least one more additional symptom, such as e.g. stiff neck, nausea, tinitus, hypoacusis or photophobia should be present (15).

The incidence of PDPH ranges between <1 % and 70 %. It depends on the procedure-related factors. PDPH incidence is influenced to the greatest extent by the type and diameter (gauge) of the puncture needle (16-21). The use of an atraumatic needle (e.g. Whitacre or Sprotte type) in comparison with a traumatic needle (Quincke type) significantly reduces the occurrence of PDPH (22). More PDPH cases are observed among younger people (17,23,24), women (17), persons with a low BMI, and those who already suffer from chronic headaches (17,25). Less frequently are reported problems in children and the elderly (10). According to the investigation reports, lumbar puncture with a traumatic needle in older people is deemed to be safe and associated with less pain and lower risk of PDPH occurrence than in younger people (26). The incidence of PDPH is the lowest in the age group 60+, in persons with Alzheimer's disease and mild cognitive disorder (27). A comparably low incidence with an even lower occurrence of PDPH at <2 % is reported in patients with Alzheimer's disease, who underwent puncture with

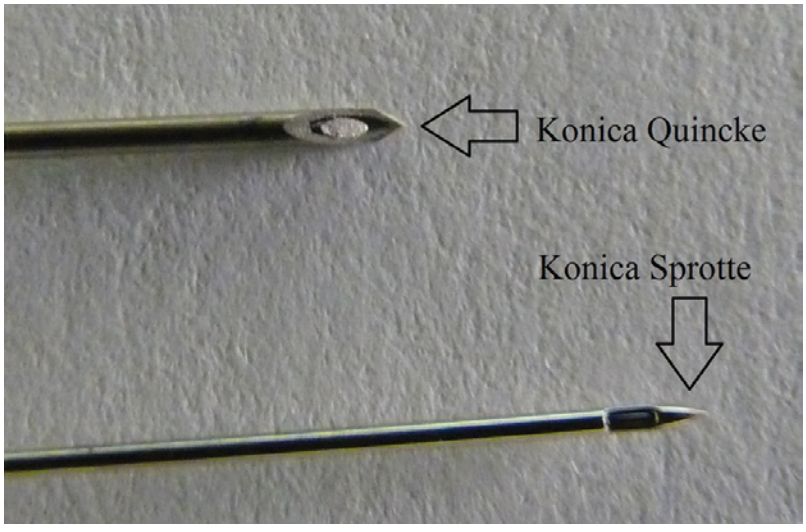


Figure 2: The tip of the traumatic Quincke type spinal needle is triangular sharpened, which enables a quick and easy penetration of the skin while the tip of the atraumatic Sprotte type needle is blunt with a side aperture. Source: Bregant T.

a 24-gauge Sprotte's atraumatic needle (28).

The use of thinner atraumatic puncture needles reduces the frequency of PDPH in all subjects with a spinal tap. There are different and not fully explained reasons why the standard thicker traumatic needles are still in use (25,29). In 1998, more than 70 % of neurology departments in Great Britain were still using traumatic needles while in only two out of 48 units they were also using thinner needles with a diameter of less than 22-gauge (30). In 2001, only 2 % of neurologists in the U.S.A. used thinner, atraumatic puncture needles (29). At the Mayo Clinic Department of Neurology in Arizona the use of atraumatic needles for lumbar puncture was introduced in 2002. Until 2008, their use increased from 0 % to 37 % (25). In 2005, the American Academy for Neurology (AAN) adopted recommendations for the use of atraumatic puncture needles, as the use of atraumatic, thinner needles was found to prevent PDPH by first-order proof, consistent with an A-level recommendation (31).

2.4 Frequency of investigation

With advanced imaging techniques, which allow identification of patients in whom lumbar puncture is contraindicated, the lumbar puncture has become a safe, routine and standard procedure. According to the data for England for the period 2011/12, as many as 55,427 in-hospital stays also included a diagnostic lumbar puncture, which – calculated per individual institution with 75,000 in-hospital stays annually – makes 1 lumbar puncture daily (32). In the same year, 0.53 % of hospital consultations in England consisted of a clinical examination combined with a diagnostic lumbar puncture (33).

The laboratory for cerebrospinal fluid diagnostics of the University Department of Neurology in Ljubljana performs between 800–900 CSF analyses yearly, while during on-call times a few CSF samples are additionally sent to the emergency laboratory. The data for the last five years show that there were 810 basic CSF investigations performed in the year 2013, 828 in 2014, 794 in 2015 and 465 in the first half of 2016 (34).

2.5 Puncture needles

For lumbar puncture neurologists use special atraumatic as well as traumatic puncture needles, which differ from each other according to the shape of the needle tip. The use of atraumatic needles statistically significantly reduces the incidence of PDPH while also reducing the costs of treatment. According to the international guidelines, which are presented below, neurologists are recommended to use atraumatic needles as a method of choice, while also using traumatic needles, which are considered more suitable for use in emergency wards.

Table 1: Larger studies comparing post-dural puncture headache (PDPH) incidence when using traumatic and atraumatic needles for routine diagnostic lumbar puncture.

Study (reference number)	Published year	Study type	Patient group (number of patients, special descriptors)	Incidence of PDPH when using traumatic and atraumatic needles	Suggested use of atraumatic needles for LP
Braune, Huffman (42).	1992	Prospective, double-blind	75	36 % and 4 %	Yes
Davis et al (38).	2014	Prospective, observational	96	50 % and 21 %	Yes; p=0.01
Duits et al (43).	2016	Multicentric, prospective	3868; patients at memory clinics (MMSE = 25 ± 5)	Total 9 %	Yes
Hammond et al (18).	2011	Prospective	187; neurological outpatients	32 % and 19 %	Yes
Jager et al (44).	1993	Prospective	600	Atraumatic needle: 3.6 %	Yes
Kleyweg et al (45).	1998	Double-blind, randomised	99	32 % and 6 %	Yes; p=0.001
Lavi et al (17).	2006	Prospective, randomised	55	36 % and 3 %	Yes; p=0.002
Luostarinen et al (46).	2005	Prospective, randomised	78	49 % and 36 %	No statistically significant difference
Peskind et al (28).	2009	Prospective, multicentric	63 patients with Alzheimer's dementia	<2 % for atraumatic needle	Yes
Straus et al (41).	2006	Meta-analysis of 15 randomised controlled trials (RCTs)	587	Absolute reduction of risk for PDPH by 12.3 % with atraumatic needle. More, but not statistically significantly more LP insertion trials with atraumatic needle.	Yes, with further research backup
Strupp et al (16).	2001	Prospective, double-blind, randomised	230	24 % and 12 %	Yes; p<0.05
Thomas et al (20).	2000	Double-blind, randomised	97	Reduction of risk for PDPH by 26 % with atraumatic needle.	Yes
Torbati et al (47).	2009	Retrospective	317; neurological emergency patients	11 % and 4 %	Yes; p=0.017
Vakharia, Lote (37).	2009	Combined retro/ prospective	52; acute neurological patients	10 % and 8 %	Yes; p<0.01

PDPH = post-dural puncture headache, LP = lumbar puncture.

2.5.1 Traumatic needles

Classic or standard lumbar puncture needle is a Quincke type spinal traumatic needle of a 22-gauge diameter and a length of 90 mm (Figure 1). The needle is marked with black colour. The tip is triangular tapered, which allows quick and easy piercing of the skin (Figure 2). However, it also makes a triangular cut in the dura, thus causing greater cerebrospinal fluid leak than that caused by an atraumatic needle, which leads to the onset of PDPH (Figure 3).

2.5.2 Atraumatic needles

Atraumatic needles are routinely used by anaesthesiologists in spinal anaesthesia (spinal block) and increasingly often also by neurologists in diagnostic lumbar puncture (35). The tip of these needles is blunt, oval-shaped, with either one or two side apertures, which allows the dura to be entered gently by pushing aside its fibres rather than being cut. Despite the overwhelming evidence of the advantages of these needles, their use has not been spread widely enough to be used routinely (25). Most frequently, neurologists abroad use 22-gauge Whitacre type atraumatic needles for lumbar puncture or even thinner 25-gauge and 27-gauge Whitacre type, and Sprotte needles (16-20,33,36-38).

2.5.3 Comparison of traumatic and atraumatic needles

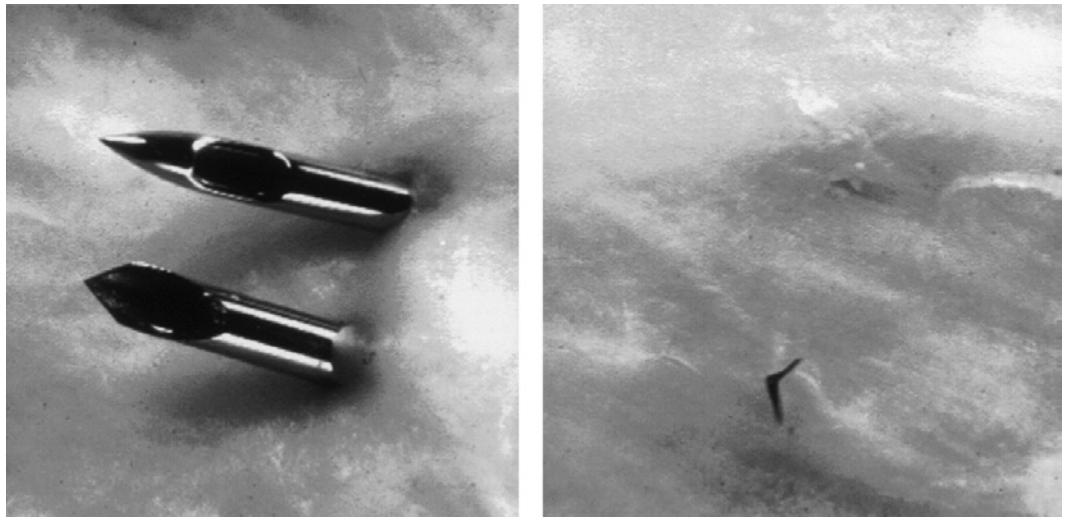
Lumbar puncture can be successfully performed with 20- or 22-gauge atraumatic needles (39). A standard atraumatic needle with a diameter of 26-gauge considerably decreases the occurrence of PDPH in comparison with a 22-gauge needle (40). Further investigations summarised in Table 1 show that the use of atraumatic needles decreases the occurrence of PDPH (16-18,20,28,38,41-47).

The investigation that stands out among them is a meta analysis of the use of traumatic and atraumatic needles, which has confirmed the safety and reliability of atraumatic needles of various diameters, their use being associated with a considerable decrease in PDPH occurrence (41). At the same time, the authors pointed out that the use of thin atraumatic needles was associated with more frequent unsuccessful punctures, however, the association was not statistically significant (41). Similar observations were reported by authors of an older investigation, which – apart from statistically insignificant increase in the number of repeated punctures – also showed a decrease in the occurrence of PDPH from 54 % to 29 % respectively when 20-gauge atraumatic needles were used as compared to traumatic ones (20). Probably this may also explain why the use of atraumatic needles has not become more widely accepted among neurologists and emergency physicians, as it is extremely important that puncture for CSF retrieval in these settings is performed quickly and efficiently.

Table 1 summarises the results of studies on the use of traumatic and atraumatic needles for lumbar puncture in neurological patients. Investigations in patients who had puncture performed outside the routine diagnostic procedures under epidural anaesthesia and all investigations in children were excluded.

2.6 Deficiencies and special features of atraumatic needles

In the studies, several factors were assessed regarding the use of atraumatic needles: possibly longer duration of (sample) retrieval, greater number of attempts /puncture repetitions, inconvenient use of a pressure gauge, price and the reluctance of the staff to use these needles.



Slika 3: Travmatska igla tipa Quincke naredi trikoten rez v duro, zaradi česar je iztekanje likvorja večje kot pri atravmatski igli, kar vodi v nastanek PPG. Vir: Strupp M, Schueler O, Straube A, Von Stuckrad-Barre S, Brandt T. Atraumatic Sprotte needle reduces the incidence of post-lumbar puncture headaches. Neurology 2001; 57 (12): 2310–2. Slika je objavljena s pisnim dovoljenjem glavnega avtorja.

2.6.1 Cerebrospinal fluid collection

With an atraumatic needle of less than 22-gauge diameter CSF collection takes longer (39,41). However, since the quantities needed for diagnostic examinations are small (3–12 ml, most often 10 ml) this should not represent a major problem (33).

Recent studies do not report higher number of puncture repetitions with atraumatic needles (18,33) Moreover, the number of puncture repetitions with the use of thinner atraumatic needles is even statistically significantly lower (33). A larger, more recent study comparing 20- and 22-gauge traumatic needles with 22-gauge atraumatic needles has confirmed the safety and applicability of atraumatic needles, as the probability of PDPH occurrence with the latter decreased by 69 % while the number of puncture repetitions did not differ between the two studied needle types (18). This observation is consistent with a larger and older anaesthesiological data meta-analysis confirming that the use of atraumatic spinal needles in patients at high risk of PDPH is appropriate and safe, and not associated with an increased risk of puncture failure (48).

CSF withdrawal requires dura penetration. The onset of PDPH is significantly influenced by CSF leak through cut dura (49). With an atraumatic needle dura fibres are only separated while with a traumatic needle the dura is cut. Therefore the technique using traumatic needle should require bevel to be aligned parallel to the longitudinal axis of the spinal cord, without rotating the needle at the end of the investigation. In atraumatic needle it is recommended to replace the stylet when removing the needle in order to avoid also withdrawing arachnoid fibres. In 21-gauge Sprotte type needle, the stylet replacement additionally reduced the occurrence of PDPH from previous 16 % to 5 % (16). Figure 3 shows the difference in the puncture wound caused by a traumatic vs. an atraumatic spinal needle when entering the dura.

Figure 3: Dural puncture hole made with a Quincke type traumatic needle is triangular and larger than when made with a atraumatic needle. The subsequent loss of CSF is larger, which

results in a higher incidence of PDPH (post-dural puncture headache. Source: Strupp M, Schueler O, Straube A, Von Stuckrad-Barre S, Brandt T. Atraumatic Sprotte needle reduces the incidence of post-lumbar puncture headaches. Neurology 2001; 57 (12): 2310–2. The photo was approved for reproduction by the first author.

The fear that CSF withdrawal with an atraumatic needle would take longer has not been confirmed in experimental conditions. The flow rates of both needles with equal diameters were tested with physiological saline solution as well as with a thicker, protein-saturated solution (50). The flow rate between both needles differed by 10 % in physiological saline solution and slightly less in protein-saturated mixture, in favour of the traumatic needle. In taking pressure measurements, the subjects were even slightly faster when using atraumatic needles and a manometer with protein-saturated mixture (50).

2.6.2 Needle prices and the cost of patient treatment

Although traumatic needles are considerably cheaper than atraumatic ones, the overall costs of patient care after the lumbar puncture performed with an atraumatic needle are much lower. A comparison between 22-gauge traumatic (Quincke type) needles and 22-gauge atraumatic (Whitacre type) needles has shown that the use of atraumatic needles of the same diameter reduced the patient care costs on the account of a considerably lower occurrence of PDPH. The rate of complications in terms of puncture repetition or failure to withdraw CSF with both needles were comparable (36).

In Europe, the price of traumatic needles is around 1 Euro while the price of atraumatic needles ranges between 5–10 Euros (35). In the U.S.A. the ratio between these prices is about the same, i.e. slightly less than 2 USD for traumatic needles and 15 USD for atraumatic needles. However, a routinely performed lumbar puncture with a traumatic needle is more expensive as compared to the same performed with an atraumatic needle, i.e. USD 192.15 vs. USD 166.08 respectively, which means that the latter costs USD 26.07 less (51). If needle prices were the same, the saved amount would be even higher, i.e. USD 41.87. Taking into account the current prices, by using atraumatic needles, the whole healthcare system in the U.S.A. could save as much as USD 10.4 million. A similar study carried out in the U.S.A. has indicated comparable savings, though the cost of their procedure with traumatic needle amounting to USD 239 is higher, while the cost of the procedure with atraumatic needle amounting to USD 187, is comparable to that in Europe (24,33). The analyses for Europe show even greater savings, i.e. USD 142 when lumbar puncture is performed with a 25-gauge atraumatic needle (33). The great savings in Europe are attributable to shorter absence from work – fewer sick leaves and fewer social transfers. It is interesting to note that the patients who require lumbar puncture irrespective of their diagnosis are absent from work 175 days if the puncture is performed with a traumatic needle, but only 55 days if an atraumatic needle is used (33).

Table 2 presents the advantages and disadvantages of the use of traumatic and atraumatic needles for lumbar puncture.

2.7 International guidelines and clinical recommendations

In 2005, the American Academy of Neurology (ANN) published recommendations for the use of atraumatic

puncture needles. The use of atraumatic, thinner needles was found to prevent PDPH by first-order proof, consistent with an A-level recommendation (31). Despite the recommendations, they found that the use of atraumatic needles at neurology departments was not widely accepted, and therefore in 2009 they reaffirmed their position that the use of atraumatic needles in diagnostic lumbar punctures should become the gold standard (25). Further studies have confirmed that the use of atraumatic needles facilitates cheaper, safer and more reliable investigations (49,51).

In the U.S.A. too, in the theory and practice of emergency and general medicine, they still use 20- and 22-gauge traumatic needles, while pointing out that the probability of PDPH occurrence with spinal traumatic needles of greater diameter is higher (52,53). The reason should be sought in the specific organisation of emergency medicine and the need that lumbar puncture be performed efficiently and as quickly as possible.

Likewise, poor compliance of specialists, with the exception of anaesthesiologists who have been routinely using atraumatic needles for spinal analgesia for years, is also noted in Europe. Practical recommendations are clear: for lumbar puncture atraumatic needles with 22-gauge or smaller outer diameter should be used (54).

Table 2: Characteristics of traumatic and atraumatic needle use in lumbar puncture.

Needle type	Traumatic	Atraumatic
Skin puncture	Easy	Harder Skin can be punctured first prior to insertion of the LP-atraumatic needle by using the 18G or green 19G local anaesthetic needle
Puncture of the ligamentum flavum and dura	A "give" (or »plop«) is felt on passing through the ligamentum flavum and dura	Dural puncture is not felt
Dural puncture hole	Triangular, larger	No cutting of dural fibers
Use of local anaesthethics	Not mandatory	Yes
Obtaining CSF	Reliable, fast	Reliable, can be slower
Several LP-attempts	Usually not	Usually not; the first attempts of LP are more successful with atraumatic needle
PDPH incidence	High	Low
Duration of hospitalisation	Prolonged	Shortened
Routine use	Yes	No
Needle costs	Eur 0.89	Eur 5.34–10.1
Overall (total) costs of patient care with LP	Higher due to complications, esp. PDPH	Lower; immediate discharge after procedure

CSF = cerebrospinal fluid, LP = lumbar puncture, PDPH = post-dural puncture headache.

Similar situation is observed in the United Kingdom. A study at an emergency department of neurology in London has proven a statistically significant decrease of traumatic punctures and the ability of the staff to learn the technique fast, so they reiterated their recommendation that atraumatic 22-gauge Sprotte type needles for lumbar puncture should be used at all neurology departments, including the emergency units (37). In Ulster, Northern Ireland, atraumatic 22-gauge Whitacre type needles were introduced for routine use after a comparative study.

Repeated appeals and studies in Europe and the U.S.A. certainly call for the use of atraumatic needles in diagnostic lumbar punctures, while pointing out the need for additional training to ensure that the transition from the use of traumatic to atraumatic needles would be as smooth and uneventful as possible (38).

3. Discussion

At the University Department of Neurology in Ljubljana, we use traumatic needles for lumbar puncture. Emergency punctures are generally performed by specialists-neurologists at the emergency outpatient clinic of the University Department of Neurology, University Medical Centre Ljubljana, with traumatic needles, which applies to both, in-hospital and outpatient procedures.

For lumbar puncture, likewise other physicians but not also anaesthesiologists, neurologists use classic spinal traumatic needles, most frequently Quincke type, with a 22-gauge diameter and a length of 90 mm. These needles are marked with black hub and have sharp bevel. Rare cases require the use of a thicker and/or longer needle with a 20-gauge diameter and/or a length of 150 mm. These needles are marked with yellow hub. The thickest 18-gauge needles is 90 mm long and is marked with pink hub. Generally, a manometer is also used with puncture in adults. The same 22-gauge Quincke type needles are used in toddlers and babies, but these needles are shorter, measuring 38 or 63 mm in length. Anaesthesiologists use atraumatic needles particularly for spinal analgesia (spinal block). These needles can be used for spinal anaesthesia as well as for diagnostic lumbar punctures and cytological diagnosis. Our anaesthesiologists generally use atraumatic needles with a 25- and 27-gauge diameter.

Differences regarding the experience in the use of traumatic and atraumatic needles for lumbar puncture between different specialists in different institutions are associated with a variety of factors. A few-fold difference in price, which is apparent at first glance, may certainly affect the accessibility in larger orders. However, the use of cheaper traumatic needles entails considerably higher hidden costs associated particularly with the occurrence of PDPH and longer post-puncture care, as shown in Table 2.

In comparison with a stiffer, thicker needle of a 22-gauge type, handling of an atraumatic thinner needle, such as e.g. 27-gauge needle, is slightly different as the needle may bend. This requires stable and comfortable positioning of the patient on a harder surface, which is generally not provided by hospital beds. As with thinner needles the time to CSF sample retrieval is slightly longer, in the fear that the procedure would take too long, we use a slightly thicker atraumatic 25- or 22-gauge needle.

In our settings too the specific organisation of work in emergency medicine requires that lumbar puncture should be

carried out quickly and efficiently, which considerably restricts the opportunities for learning new diagnostic techniques through regular work. Therefore it would be necessary that the introduction of a new lumbar puncture technique with atraumatic needles should be accompanied with additional training, which, however, calls for additional efforts from the side of the management as well as the staff.

The transition from traumatic to atraumatic needles and the learning of new technique should not pose a particular problem, as some of our colleagues, and in particular anaesthesiologists, learn how to use them already during their residence training. Considering the material that is already available in the UMC Ljubljana, it would be reasonable to start using atraumatic 22- or 25-gauge needles of Sprotte type. When introducing the use of these needles, it would make sense to organise a practical workshop for interested physicians beforehand.

The use of atraumatic needles for lumbar puncture is reasonable in elective diagnostic lumbar punctures and in patients that are prone to developing PDPH, i.e. in young people, women, tall persons and those with a low BMI. Thus we could reduce the duration of in-hospital stays, as currently the patients after lumbar puncture generally stay in the hospital whole day, or in the case that the procedure is performed on an outpatient basis, two hours. The comparison of both techniques would allow for justified change of the needles and staying abreast of the modern international guidelines with faster and better patient care.

The change of traumatic needles for atraumatic ones seems reasonable particularly in neurology departments, whereas in emergency departments, due to the specifics of their work, lumbar puncture with a classic 22-gauge traumatic needle of Quincke type remains the gold standard.

4. Conclusion

Review of the literature and guidelines on the performance of lumbar puncture indicates that it would be reasonable to use atraumatic puncture needles also in the Slovenian neurology departments. Neurologists are recommended to start using atraumatic needles for elective lumbar punctures. In this way we will be able to provide a higher quality patient care, which will be consistent with international guidelines.

Acknowledgement

The authors thank medical director of the University Department of Neurology of the UMC Ljubljana David B. Vodušek, MD, PhD, for his expert guidance and advice.

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