B. Braun Satellite Symposium

Advanced
Regional Anesthesia

Catheter Techniques –
Central and Peripheral

Why don't you
use it more?

Chairperson:
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Introduction

Presenters and lecturer:
■ Prof. Dr. J. Biscoping, Germany
■ Prof. Dr. M. Möllmann, Germany
■ Dr. O. Grimaud, France
■ Dr. P. Grossi, Italy

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SHARING EXPERTISE

CSE – Why use it?
Advantages and Disadvantages

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Spinal anaesthesia is a simple and economical method, and a small dose of local anaesthetic produces an effective block with complete muscle relaxation. Compared to general anaesthesia, severe respiratory depression is uncommon, and postoperative sedation is avoided. Disadvantages, such as the risk of postdural puncture headache, have given rise to the use of epidural anaesthesia as an alternative. In this method, an exact block height can be titrated and maintained with supplementary doses, and it is possible to use the catheter for postoperative pain relief. Epidural anaesthesia is more time consuming and involves a higher incidence of incomplete blockade, especially of the motor roots, despite large doses of local anaesthetics. Hence a combination of these two methods would be attractive.

In the literature, various methods are described for the practical conduct of combined spinal and epidural anaesthesia (CSE) and it was first described in 1937 by Soresi as "episubdural" technique. Performing the single-space technique (SST) the Touhy needle may function as a more suitable introducer than a normal introducer when small-bore spinal needles (27- to 29- gauge) are used. However, dural identification may be complicated; one cannot be sure of dural penetration after a successful localization of the epidural space, as any deviation of the Tuohy needle from the sagital plane may cause the spinal needle to enter the epidural space but pass the dural sac laterally. Finally, it is considered difficult to test the position of the epidural catheter in SST.

The necessary epidural dose for extension of a spinal block vanes between 1.5 and 3 ml per added segment, less than needed for a conventional epidural anaesthesia. By performing CSE, rapid onset, profound and uniformly distributed analgesia with good muscle relaxation of spinal anaesthesia results, as well as the possibility for peri- and postoperative epidural supplements. By this, the technique is useful in many orthopedic (arthroplasty of knee – or hip-joint) and obstetric (cesarean section) procedures, because the time from injection to the full effect of the block is short. Excellent results are also reported in advanced labour, when a small dose of a long-acting local anaesthetic such as bupivacaine or ropivacaine with a short-acting opioid was given intrathecally, followed by epidural top-ups of the local anaesthetic if necessary.

However one should bear in mind that any epidural top-up should be given in small incremental doses as it may produce higher levels of block than expected by compressing the dural sac.

Continuous Spinal Anaesthesia (CSA) – Advantages and Disadvantages

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Introduction

The concept of continuous spinal anaesthesia (CSA) was first described by the British surgeon Dean in 1907 (1) who left the spinal needle in place during an operation. In 1939, Lemmon (2) introduced the malleable needle and the split mattress technique to overcome the problems of needle trauma and breakage. Tuohy (3) introduced the catheter technique – he used a no.4 ureteral catheter inserted through a 15 gauge needle. Throughout the following years, the fear of CSA resulting in high incidence rates of postdural puncture headache (PDPH) and neurological complications, along with the development of the epidural technique, discouraged the frequent use of CSA. Since the incidence of PDPH depending on cerebrospinal fluid loss is due to needle size and tip configuration (4), Hurley and Lambert introduced micro catheter systems in an effort to reduce frequency of PDPH associated with spinal anaesthesia (5). Thus, CSA technique became suitable also for the use in younger patients without incurring an unacceptable risk of PDPH.

However, serious neurological complications such as cauda equina syndrome after CSA performed with microcatheters were described by Rigler et al. in 1991 (6); additional cases after CSA administered through microcatheters resulted in a safety alert of the Food and Drug Administration in 1992. Spinal micro catheters thinner than 24 gauge intended for the use in CSA were banned from the US-market. Furthermore, manufacturers of local anaesthetics declared that their products were not indicated for the use with CSA. In all, approximately 12 cases of cauda equina syndrome after CSA with microcatheters have been reported (7).

This reinforced the misconception that CSA was a dangerous technique. However, with experiences gained from more than 3000 patients in the course of five years, CSA appears in a totally different light to me – namely as an effective and safe technique when performed correctly.
In a review from 2003, Bevacqua also underlined CSA is a useful and safe technique under routine clinical conditions (8); thus, I give a brief update on the present status and possible future directions for CSA.

Intraoperative analgesia

CSA offers the attractive possibility of extending the block during surgery when needed. It provides an easy technique to reach an adequate level and duration of anaesthesia with small intermittent doses of local anaesthetic, which also minimizes the risk of possible cardiovascular and respiratory disturbances.

Several studies have shown that haemodynamic stability is greater with CSA than with continuous epidural anaesthesia (CEA). For example, Sutter et al. (9) retrospectively compared more than 700 patients who underwent lower limb orthopaedic surgery either with CSA or with CEA. Although the patients in the CSA group were at a higher anaesthetic risk, the incidence of failures was lower and fewer patients showed a decrease in the mean arterial pressure. CSA thus was more reliable and provided better cardiovascular stability for elderly and high-risk patients.

Such results can be attributed to the fact that CSA allows administration of small incremental doses of local anaesthetics at different concentrations and baricity according to the need of the individual patient, whatever surgical procedure and position are required. The better cardiovascular stability observed in CSA patients seems to be a result of the more easily controlled sympathetic blockade (10).

Other advantages of CSA compared with CEA are a more complete muscular blockade and smaller dosage of local anaesthetic to obtain adequate anaesthesia, without any risks of systemic toxic effects due to absorption. The large dose of local anaesthetics administered with epidural anaesthesia means that elderly patients are at greater risk of intoxication because of their reduced clearance for local anaesthetics and their reduced cardiac output and liver blood flow (11). Since the elderly population is increasing, and since these patients often have concomitant medical problems and reduced physiological adaptation capacities, CSA might be the anaesthetic technique of choice for such patients, especially when haemodynamic stability is critical (12, 13, 14, 15).

Postoperative pain management

By contrast to the question of intraoperative anaesthesia with CSA, there are only few studies published on the use of spinal catheters for postoperative analgesia (16, 17, 18, 19).

There is general agreement about the major goals of postoperative pain treatment such as minimizing the patient's discomfort, facilitating the recovery process and avoiding side effects. Nevertheless, unrelieved postoperative pain is still reported to be a rather common clinical problem (20, 21). There is increasing evidence in the literature that especially for major orthopaedic surgery techniques using regional anaesthesia provide a pronounced inhibitory effect

on the stress response and have beneficial effects on outcome variables (22). Finally, the fact that morbidity and hospital stay decrease with the use of such techniques implies economic aspects that should not be underrated nowadays (23, 24).

Postoperative pain relief using CSA was first described by Ansbro et al. (25). Concerning the question whether to prefer CSA or CEA for postoperative pain control, Niemi et al. (26) randomized 55 patients who underwent hip arthroplasty under spinal anaesthesia to receive postoperative analgesia either using an intrathecal or an epidural catheter. Spinal catheter failures were found to present a significant disadvantage of CSA. However, Standl et al. (27) presented 100 patients undergoing lower limb orthopaedic surgery who received CSA using a 28 gauge catheter inserted through a 22 gauge needle and 0.25 % bupivacaine titrated as bolus injections in the postoperative period. Their data suggest that CSA provides good postoperative analgesia, associated with a low incidence of complications and a high acceptance of CSA reported from the patients.

In our research group, we found in a randomized, prospective study with 102 patients that both techniques result in adequate postoperative pain relief (28). In both groups, the level of pain was gauged from verbal rating score and from a visual analogue scale. In the CSA-group 90.2 % reported complete analgesia on the verbal rating score, but only 21.6 % of the CEA-group did so. Throughout the study period of 72 postoperative hours, the visual analogue scores given by the CSA-group were significantly lower than those of the CEA-group. It can be concluded that CSA and CEA proved to be effective and safe, but CSA provided faster onset of pain relief, ensured better analgesia and produced more satisfied patients. As the incidence of side effects such as motor blockade, nausea and vomiting was comparable in both groups, CSA should be regarded as an attractive technique for a flexible postoperative pain therapy.

Complications

Asked about their main point of fear, most critics of CSA mention two complications: neurological damage and cerebrospinal fluid infection.

Unfortunately, only few prospective studies have formally investigated the real incidence of neurological complications (29). That is why we tried in our research group to evaluate the frequency of permanent neurological sequelae after CSA in a standardized pre- and postoperative investigation (30). A preoperative neurological status was gained from 150 patients who underwent hip arthroplasty with CSA technique, and the same neurological status was gained by the same anaesthetist ten days after surgery. At the occasion of this examination, no patient had noticed any remarkable differerence on his own; nevertheless, in four patients who suffered from Diabetes mellitus II a decrease of the quadriceps-femoris reflex was found. No differences in physical power were found and no cauda equina syndrome arose. All patients reported complete satisfaction with anaesthesia and postoperative shape and no serious complications were found – thus CSA should no longer be just condemned as a „risky technique", but more

prospective clinical studies on this question are mandatory in the future.

In order to research the risk of infection when performing CSA in the postoperative period, in 144 patients, who successfully underwent CSA for surgery, CSF was sampled both immediately after positioning and before removing the catheter (31). Leukocytes, proteins and glucose concentration were,determined; meningism and infection parameters were compared preoperatively and afterby removal. The catheter was removed under aseptic conditions,conditions; the tip was cut and washed with saline. CSF, tip and saline were cultured to find microbiological contamination. In five cases bacteria were found in CSF, the catheter tip was contaminated in eight cases and saline in one case. Statistically significant positive correlation with the indwelling catheter time was found. Signs of local infection at the insertion side appeared in three cases with CSA lasting longer than 90 hours. However, no patient showed evidence of local or systemic infection with CSA for up to 200 hours. Taking into consideration that a meticulous technique of insertion and handling the catheter is mandatory, as well as a daily inspection of the insertion site, we conclude from our results that fear of infection should no longer lead to restrictions in the use of CSA in the postoperative period (even when performed for 200 hours).

In conclusion, CSA is an established anaesthetic technique that has advantages over CEA especially in elderly or high-risk patients. Correctly used, CSA is an effective and safe technique – not only for intraoperative anaesthesia but also for an up-to-date postoperative pain treatment. Former doubts about its safety can be regarded as eliminated by clinical studies published over the last years that should encourage the more frequent use of this technique in the future.

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Continuous Spinal Anaesthesia for Major Abdominal Surgery benefits and limits

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Patients undergoing major abdominal surgery requires intra operative protection and postoperative multimodal support in order to prevent organ functions from decreasing and to obtain early patient recovery[1]. Using Regional Anaesthesia per and post operatively reduces all major complications and even mortality within 30 days (Finucane).

Effective postoperative analgesia affords the inhibition of the reflex response of the intestinal motility (anticipating the discharge with 48 hours)[2,3] and allows rapid mobilisation of the patient which is the best method of reducing postoperative hypoxemia.

CSA affords a good alternative to Combined Spinal Epidural for stress free surgery and post-operative pain relief. Möllmann pointed that CSA is even superior because spinal block is a total muscular relaxant method, affording better surgical conditions, with lower doses of LA and opiates necessary to be administered during long lasting surgery procedures.

Even though it is an old technique, CSA didn't find general acceptance and has been used very little in the last 20 years. The different types of catheters available (20-G through 18-G Tuohy needle, 24-G over a 29-G Quincke spinal needle and microcatheters 28-G through 22-G Quincke or Sprotte needle) present advantages and disadvantages, according to their characteristics.

Dural puncture with an 18-G Tuohy needle makes this procedure most suitable for use elderly people; 20-G catheter introduced in the subarachnoid space may induce easily transient radicular irritation.

Cauda equina syndrome associated with microcatheters and use of hyperbaric local anaesthetics gave CSA a bad reputation[4]. Whereas the use of microcatheters by some authors in lower abdominal surgery was not successful because of the difficulty of maintaining level of anaesthesia[5].

Several recent studies compared microcatheters through the needle (28-G Portex) and catheters over the needle (22-G Spinocath). Some concluded that insertion, maintenance and clinical effects were better achieved with the Spinocath[6,7].

DeAndreas at al considered both systems to be easy to use and adequate for CSA[8] The challenge of using Braun Spinocath was to obtain good surgical anaesthesia for major abdominal surgery with haemodynamic stability, good comfort for the patient per-operatively and efficient postoperative pain relief, by using only the spinal route, and without side effects!

Background: We have used CSA in 30 ASA I-IV patients aged 36–81 years, who andberwent different types of major open abdominal surgery for cancer (radical prostatectomy, right or left hemicolectomy, and hysterectomy, as the sole anaesthetic technique with the exception of light sedation when requested by patients. In 2 other patients general anaesthesia was combined with CSA because of the type (gastrectomy and respectively sygmoidectomy by laparoscopy) and the duration of surgery (6 and 4 hours). These cases and their management will be discussed.

The mean duration of surgery was 180 ± 20 min. and characterised by remarquable haemodynamic stability and perfect surgical comfort.

Postoperative pain relief was provided in all patients through 48 to 72 hours by patient- controlled spinal opiates and local anaesthetic: either top ups on demand of: 2 ml bupivacaine 0,125 % + 1 ml saline and 0,1 mg morphine (every 8 hours if necessary), or continuous infusion of 12 ml bupivacaine 0,125 % + 0,3 mg morphine at the rate of 0,5 ml hour – 1. Supplementary proparacetamol (2 g) was administered every 8 hours if necessary.

Additional postoperative monitoring included:

- pain intensity, using visual analog scale (VAS value range from 0 to 10), was measured every 4 hours
- degree of sedation
- respiratory rate
- segmental level of sensory block using temperature discrimination
- motor block, by a modified Bromage score (range from 0 to 3)
- nausea
- pruritus
- headaches
- bacteriological culture of all catheters after removal

The average VAS was 1 in the first 24 hours for a mean consumption of morphine and bupivacaine of $0,2 \pm 0,05$ mg and respectively $7,5 \pm 2$ mg 24 hours – 1. Then, the requirements of analgesia decreased progressively.

No motor block (Bromage scale 0 and 1), no respiratory depression occurred with these doses, patients having been mobilised the next day. Pruritus (20 %) and nausea (22 %) were successfully treated with naloxone 4 mg s.c .

2 patients, aged 36 and 51, experienced postdural puncture headachemigraines within the first 2 days and required a blood patch.

Postoperative ileus lasted on average 36 hours (in 2 patients bowel movements started less than 15 hours after surgery with gastric tube removal at day 1) making possible early nutrition, mobilisation and recover.

There was no complication related to anaesthesia, no hypotension or bradycardia, no cauda equina syndrome or transient radicular irritation deplored.

No microbiological contamination of the catheter was found.

In conclusion, CSA with Braun Spinocath for major abdominal surgery is safe and efficient, avoiding general anaesthesia and use of muscular relaxants.

Patient-controlled spinal analgesia affords early mobilisation with active nursing improving oxygenation and reducing respiratory morbidity.

Earlier exercise and nutrition are the key of rapid rehabilitation and of good patients' early and late outcome.

Last but not least, the cost of this method is low (Spinocath, drugs and total hospital stay included).

Spinocath represent an adequate catheter, adapted to the dura puncture (29-G needle, 24-G catheter) affording the advantage of a directional needle in orienting the catheter within the spinal canal.

Although it requires experience and a careful technique, CSA with Spinocath is a Suitable method not only for high risk patients' early and late outcome, but for all patients' outcome undergoing major abdominal surgery.

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Continuous Peripheral Nerve Techniques

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Introduction

Catheterization of peripheral nerves and brachial plexuses is considered a technique of choice for the control of chronic, intra- and postoperative pain. Through peripheral nerve blockade the following targets are reached:

■ Analgesia of the distal segments of limbs

■ Sympathetic block, vasodilatation, and healing of peripheral lesions

■ Prevention of post-traumatic pain dystrophy

■ Early aggressive physiotherapy permitted by good analgesia.

Actually, the continuous blockade of the brachial plexus has become one of the most interesting therapeutic methods for chronic pain dystrophy (2, 3, and 4).

The sympathetic nerve chain, especially the postganglionic fibres, lies very near the somatic fibres of the trunk that innervates the upper limb. Anaesthetic block always includes a sympathetic block, noticed by the patient as a sensation of warmth, is a sign of proper localization of the nerve structures.

The use of the electrical nerve stimulator (ENS) is now considered mandatory for the search of peripheral mixed nerve fibres. The device must not represent a substitute of a deep knowledge of anatomy and distribution of nerve fibres. In the last year several reports in literature showed a growing interest in new devices and a deeper research into the physiology of nerve conduction and anatomy.

The last edition of Raj: Textbook of Regional Anesthesia (5) includes a series of updates on techniques and devices. The study by Grossi outlining the development of anatomical approaches through "anaesthetic lines", describes a frontal view of the underneath pathway of nerve fibres and plexuses, and represents a different insight into performing a block, looking tridimensionally at the complete structure of the nerve fibres, which may be blocked anywhere along their entire pathway, from proximal to distal.

Percutaneous electrode guidance (PEG)

The concept of prelocation has been developed and enlarged by a study of Urmey (6), where the percutaneous localization of the nerve is obtained with a new device, that permits the introduction of the insulated needle in a precise way ; this lastly is stimulated once more to check the correct positioning over the nerve. Recently (7)) the design of this device has been improved, with the stimulating needle included in the shaft, in order to facilitate its grip and the introduction of the needle through the skin. PEG concept involves indentation of the skin and subcutaneous tissues to permit transcutaneous electrical stimulation with a cylindrical, smooth-tipped electrode probe. In order to prelocate a targeted nerve or neural plexus the probe is used to physically guide the block needle over the nerve or nerves. This allows for transcutaneous nerve stimulation without patient discomfort, simplifying the performance of peripheral nerve or plexus block and decreasing the number of invasive needle passes used to search for nerves compared to methods that are presently used.

Twitches

After localization of the nerve structure another problem still debated is what specific peripheral twitches should be considered a relevant indication of nerve fibre location? Tonidandel (8) demonstrated that the success rate of an interscalene block has the same incidence when pectoralis major or biceps or deltoid muscles are elicited at a low amperage of 0.3 mA. These results that show the importance of accurate anatomical localization, followed and confirmed by accurate electrical nerve stimulation. The work conducted by Pham Dang (9) is oriented on continuous blocks, where they suggest by stimulating the nerve through a stimulating catheter, they obtained a higher success rate, lasting for a protracted period of time. Catheterization of the nerve structures is crucial for continuous analgesia, but the use of the stimulating catheter appears not optimized, since it is necessary to use higher amperage, 3 to 5 fold, to obtain a comparable peripheral twitch, compared with the one used for the single injection technique,. The repetition of the block after the first attempt to reach a stable position, obtained in 60 % of cases, reached a 98 % of success.

Multiple or single stimulation

Sia (10) conducted a prospective, randomized study to compare the success rate, performance time, and onset time of surgical anaesthesia of a four-injection brachial plexus block performed at the axillary or at the humeral level using a peripheral nerve stimulator. All patients received 40 mls of a mixture of equal parts of 0.5 % bupivacaine and 2 % lidocaine The incidence of complete block (91 % versus 89 %) and the onset time of sensory block (15 +/- 6 min versus 16 +/- 7 min) were not different between the groups The differences found between the groups could be considered clinically unimportant. There remains the question of tourniquet pain during operations for the correct choice of approach. Another study regarding midhumeral approach, by Paqueron (7), studied a population of consecutive patients aged > 70 yr or < 70 yr, affected by traumatic injuries of the upper limb. A mid-humeral block with a small volume of ropivacaine,

0.75 % was performed. Two groups of median ages 77 yr (95 % CI, 72-81 yr) and 39 yr (95 % CI, 27-46 yr) were treated. Both groups had similar times to complete sensory blockade. The elderly group had longer durations of complete sensory (390 min [range, 280-435 min] vs.150 min [range, 105-160 min]; P< 0.05) and motor (357 min [range, 270-475 min] vs. 150 min [range, 90-210 min]; P< 0.05) blockade. Duration of complete sensory block was significantly correlated with age (rho = 0.56; P< 0.05). The authors conclude that age is a major determinant of duration of complete motor and sensory blockade with peripheral nerve block, perhaps reflecting increased sensitivity to conduction failure from local aesthetic agents in peripheral nerves in the elderly population.

Single or multiple stimulation is a common topic when any approach to the BP is proposed, Gaertner (11)studied, in a multicentre, prospective and randomized evaluation, the success rate of coracoid infraclavicular nerve blocks performed with a nerve stimulator eliciting 1 or 3 motor responses. Eighty patients who presented for elbow, forearm, or wrist surgery were randomly allocated in : group 1 (single stimulation), 30 mls local aesthetic (LA) was injected after locating only 1 of the median, ulnar, or radial motor responses or group 2 (multistimulation),where 3 responses were located: musculocutaneous, median or ulnar, and radial response, corresponding to the lateral, medial, and posterior cords. A total of 10 mls LA was injected on each response. Bupivacaine 0.5 % and lidocaine 2 % with epinephrine 1:200,000 (1:1 vol) were used as the LA mixture. Block duration was slightly increased in the multistimulation group (P =.004). The onset time of sensory and motor block was faster in each nerve distribution, particularly in the radial, musculocutaneous, and antebrachial nerves. The success of anaesthesia increased in the multistimulation group. The success rate of the block increased from 40 % in the single stimulation group to 72.5 % in the multistimulation group (P <.0001). The infraclavicular block with stimulation of all 3 cords of the brachial plexus proved a major success compared with a single stimulation technique. This dramatic difference may be explained with the relative low volume adopted for the site of the block, where the plexus is spread around the artery .

A different as approach is required for continuous blocks, where the search of the "best twitch" becomes mandatory, with the aim of obtaining a selected block of a specific area.

In 1973 Raj proposed the infraclavicular approach to the brachial plexus, to include those fibres which innervate most of the upper limb. This technique followed the previously proposed techniques by others (Bazy 1914; Babitsky 1918) and had more modification in the following years (Sims 1977,Whiffler 1981).

The modified technique (Grossi 1999), performed with the arm abducted to the trunk showed some advantages:
- The possibility of positioning a catheter.
- The inclusion of the musculocutanuous nerve block.
- The simplicity of the approach and catheterization with the help of ENS.
- A safe fixation to the skin, with less incidence of mobilisation compared with infraclavicular and axillary approaches.
- Minor complications compared to central blocks.
- Major sterility compared to axillary blocks.
- Less possibility of obstruction or kinking of the catheter.
- An ideal alternative when ankylosis, fracture or reduced mobility of the shoulder is present

The infraclavicular approach is performed by the following steps:
- The introduction of the ENS needle (at least 10 cm) perpendicular to a line ("anaesthetic line" of Grossi,(12) traced by the posterior border of the sternocleidomastoid muscle and the axilla, where the pulsation of the axillary artery is felt. The intermediate point is the middle point of the clavicle and the middle point between the coracoid process and the chest lateral profile.
- This line, ideally, demonstrates the position of the brachial plexus under the skin.
- After local infiltration of the skin, the needle is introduced perpendicularly to the skin, or with an angle of 30° in direction of the axilla, being further away from the chest wall, the upper limb is abducted. The neurovascular bundle is found at the depth of approximately 5cm, and the typical twitches (flexion-extension of the elbow, wrist and fingers) can be evoked. After localization, the catheter is introduced in the direction of the axilla, or cephalad if the upper part of the arm is the target of analgesia.

The axillary approach is a more straightforward technique, because of the easy reference points and the possibility of placing a catheter with a tangential approach to the nerve bundle (perivascular of Winnie). The peripheral twitches are similar to the infraclavicular approach, except for the musculocutaneous nerve, that is never included. The disadvantages are the difficulty of fixation of the catheter, which easily angulates (unless it is armoured), ease of migration and the location is full of contaminated structures (hair, sweat glands, etc) .

Lower limb

The complete nerve block of the lower limb is more complicated because of the rich nerve distribution.
- Lumbar plexus, using at least two approaches. The combined block of the femoral and sciatic nerve is rather easy (12). It can be performed in a totally anterior approach ;the femoral nerve emerges beneath the inguinal ligament, lateral to the femoral vessels. By advancing the needle in the direction of the lesser trochanter needle at the right depth the sciatic nerve will be found. Usually it is preferable to use the classic separate approaches of the both nerves; the femoral nerve with the anterior approach and the sciatic nerve with posterior or lateral approach.
- the combined block of the two nerves does not result in a complete analgesia of the lower limb (proximately it is also innervated by the Obturator nerve and the lateral femoral of cutaneous nerve)
- The popliteal approach is a very useful technique for the treatment of pain syndromes of the feet:

A catheter can be introduced in a cephalad direction, at the apex of the popliteal fossa. It is efficective, and useful for prolonged therapy and well tolerated by the patients.

In this technique the use of the ENS is mandatory for correct positioning of the catheter.

Materials and Techniques

The materials are classified in two parts, depending of the technique introducing the catheter.
1. The catheter inside the needle (modified Tuohy)
2. The catheter on/outside the needle

In both methods it is possible to use the stimulating tip of the needle, or the point of the needle that is just outside of the catheter, acting like an electro stimulator.
A promising device has been presented by Urmey (6,7), who showed the possibility of localizing the nerve fibres percutaneously with a special device, through which is possible to introduce the stimulating needle.
The following steps are
- eliciting peripheral twitch to confirm the positioning
- Injecting the local anaesthetic solution.

Drugs and Methods of Administration

The ideal drug should have some specific properties.
- Long-acting analgesia
- Less effect on the motility
- Little toxicity and tachyphylaxis effects

The most recent drug for treatment of chronic pain is l-bupivacaine, with less toxicity because of its purity and levo-enantiomer. Some authors prefer to use the concentration of 0.125 % and small volume via a volumetric pump (0,5 / 2 ml hr).This procedure seems to be the most indicated for the treatment of localized chronic pain, especially if it is combined with clonidine. For the treatment of postoperative pain it is preferable to use a higher volume of infusion (5-7ml/hr). The administration depends on the type of pump; electronic pump, mechanic pump or elastomeric pump. Whereas clonidine seems to prolong the effect of the local anaesthetic (13), morphine does not increase the performance of the anaesthetic drug (14).

Conclusions

The catheterisation of nerve structures is a very useful method for the treatment of chronic pain pathologies. This technique is essential in postoperative pain control, especially when prolonged peripheral vasodilatation is required, in treatment of pain dystrophy and chronic pain pathologies of the upper and lower limb (diabetes, ischemia, connective tissue disorders, vasculitis), and where the possibility of aggressive early postoperative physiotherapy and treatment of ankylosed joints is a major advantage.

Brachial plexus blocks were confined to the axillary approach until few years ago. Only in the recent past several hundreds of citations regarded a variety of new approaches to the plexus, combined techniques, optimization of electrical stimulators, and percutaneous devices for prelocalization. The education of anaesthetists is directed to them becoming more confident with regional anaesthesia techniques, especially with continuous blocks, to improve the success rates, and at the end to provide greater patient safety .

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