Computed Tomography Scan-guided Neurolytic Superior Hypogastric Block Complicated by Somatic Nerve Damage in a Severely Kyphoscoliotic Patient

To the Editor — We report a case in which computed tomography (CT) scan-guided superior hypogastric block for management of malignant perineal pain was complicated by sensory impairment. A 57-yr-old woman with carcinoma of cervix, previously treated by hysterectomy and radiotherapy, presented with perineal pain. The pain had been present for 6 months, and was described as burning, heavy, and disturbing to her sleep at night. She had to rely on transdermal fentanyl, 25 µg/h with rescue oral morphine up to 70–80 mg/day for pain relief. Her average pain score was 5–7 of 10 on visual analogue scale (VAS), but she could not tolerate a higher dose of opioid because of sedation and troublesome nausea and vomiting. She had a severely kyphoscoliotic spine caused by a previous tuberculous infection.

Diagnostic superior hypogastric plexus block was attempted with the two-needle posterior approach under biplanar fluoroscopic guidance. Because most of the lower lumbar vertebrae were collapsed, it was almost impossible to define the exact anatomy. However, 8 ml of bupivacaine, 0.25%, was injected bilaterally over the anterior aspect of L5–S1 vertebral body. It resulted in complete pain relief for 7–8 h after the block, but it also was associated with partial motor paralysis of her right lower limb and sensory deficit for 2–3 h. The difficulty experienced during the diagnostic block prompted us to plan the neurolytic block under CT scan guidance.

Computed tomography scan was performed with the patient lying in the supine position, aided by pillows to prop up her upper back because of her severe kyphotic deformity. A General Electric (Milwaukee, WI) HiSpeed Advantage Plus spiral CT scanner was used. From lateral and frontal scout images, 5-mm thick contiguous axial scans were obtained from L4 to S1. A point 5 mm caudal to the aortic bifurcation, at S1, was identified. By means of a superimposed grid on the axial image as seen at the CT console monitor and by using corresponding laser light beams at the CT scanner gantry, the skin was surface marked, cleaned, and draped. Without gantry angulation, a 22-gauge Chiba needle was inserted. The final position of the needle tip was located just caudal to the aortic bifurcation, medial to the proximal right common iliac artery. A test dose of 2.5 ml of nonionic contrast medium (Omnipaque 300) confirmed opacification of the retroperitoneal space adjacent to the proximal common iliac vessels (fig 1). Eight milliliters of phenol, 10%, was then injected followed by 1 ml of saline during withdrawal of the needle. The whole procedure took 1 h.

Two weeks after neurolytic block, she was maintained on oral morphine, 60 mg/day with a VAS score of 1 or 2. However, she was troubled by persistent right lower limb paraesthesia after the block. Physical examination revealed decreased sensation to light touch and temperature over the right L4–S1 dermatomes, although there was no motor impairment. The paraesthesia was helped by transcutaneous electrical nerve stimulation (TENS) therapy. She also complained of mild abdominal pain in the first 2 days after the neurolytic block, which subsided spontaneously. There was no sign of infection, peritonitis, or urinary incontinence.

Efficacy of the superior hypogastric block in patients with pelvic malignancy and visceral pain had been demonstrated by Plancarte, et al. (1990) and Oscar, et al. (1993), and is further confirmed in our case. In their series, no complications resulting from the block were recorded. Although not described in detail, it was presumed that their patients had fairly normal anatomy of the lumbosacral spine. In this case, the severe kyphoscoliotic lumbosacral junction deformity and the semirecumbent position of the patient may have contributed to the somatic nerve damage, possibly by spreading the neurolytic solution posteriorly to involve L5 nerve rami and caudally to damage the S1 nerve rami. The asymmetric collapse and deformity of the lumbar spine probably resulted in spread of more neurolytic solution to right side (fig 1). With the experience in our case, we suggest that caution should be exercised in patients with severely deformed lumbosacral spines, and perhaps a smaller volume of neurolytic agent should be used.

Anesthesiology, V 86, No 6, Jun 1997

Fig. 1. Axial computed tomography of the upper sacrum shows the position of the needle tip located just postero medial to the right common iliac vessels, which have been faintly opacified by intravenously administered contrast agent. The retroperitoneal space is delineated by a test dose of Omnipaque 300 (arrows). The S1 foramina are arrowed (arrows). Although bilateral spread of Omnipaque 300 is shown, it is more marked on the right side. (Reference image at the bottom right corner shows location of the axial section on the frontal scout image.)
Nomenclature for Computer-assisted Infusion Devices

To the Editor—Computer-assisted infusion devices are open loop control systems that allow the anesthesiologist to select the target blood or plasma concentration or, in some patients, the target effect site concentration likely to be required to achieve a particular pharmacodynamic effect. Depth of anesthesia then is controlled by the anesthesiologist, making adjustments to the target setting as required for each patient.

All such systems require a microprocessor-controlled infusion pump programmed with infusion rate control algorithms linked to a pharmacokinetic simulation program. The program includes a pharmacokinetic model and a specific set of pharmacokinetic parameters for the drug to be infused. Individual academic groups have referred to this technology by a variety of acronyms, including CATIA (computer-assisted total intravenous anesthesia), TIC (titration of intravenous agents by computer), CACI (computer-assisted continuous infusion), and CCIP (computer-controlled infusion pump). The term, target-controlled infusion (TCI) also has been used in this context. Although TCI covers the concept common to all the previous systems, it avoids implying that a computer rather than an anesthesiologist is controlling the depth of anesthesia. Additionally, commercial TCI systems will not likely require an external computer.

In using and describing any TCI system, there is a need for consistent terminology to identify the drug concentration described, the site at which this concentration is determined, and the pharmacokinetic parameters used in the system. The TCI system should display the target concentration that has been set by the user ($C_s$) and the concentration that the TCI system calculates will have been achieved ($C_{\text{calc}}$). $C_{\text{calc}}$ is preferred to $C_s$ (predicted concentration) to prevent confusion with $C_p$ (plasma concentration). In assessing the predictive performance of TCI systems, drug concentrations are measured ($C_m$) and compared with $C_{\text{calc}}$. In many cases, the site at which a particular concentration is determined is obvious and always should be mentioned in any article. Where there is need to specify the site, the previous terminology can be expanded as follows.

$C_p$ = target plasma concentration;

$C_{\text{calc}}$ = target effect site concentration;

$C_m$ = measured plasma concentration;

$C_{\text{calc}}$ = calculated plasma concentration; and

$C_{\text{calc}}$ = calculated effect-concentration.

The time course and magnitude of the pharmacodynamic response achieved at a given $C_s$ will be influenced by the pharmacokinetic parameters incorporated in the system used. Thus, whenever a target or calculated concentration is given in a manuscript, authors should ensure that they provide information on the pharmacokinetic model and parameter set used. When many models are being used, the use of a second subscript to identify the pharmacokinetic parameter set used would be unambiguous, e.g., $C_{\text{calc}}$ or $C_{\text{calc}}$.

In relating pharmacodynamic effects to drug concentrations, $C_{95}$ has been used as the measured plasma concentration ($C_{95}$), at which there is a 50% probability of suppressing a response to a given stimulus. This will continue to be an important index because $C_{95}$ will be independent of the device used. In clinical research and routine clinical experience with TCI systems, wherein information on measured concentrations may not be available, observations based on $C_{\text{calc}}$ displayed by the TCI system when a particular effect is observed may be of more value to a clinician. Ideally, $C_{95}$ or $C_{95}$ (with the PK/PD model specified in the text) should be the index used, but $C_{95}$ or $C_{95}$ may be suitable alternatives.