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Surgical Pain Management

I. General principles (White and Sweet 1969; Willis 1985; Tasker 1987; Gybels and Sweet 1989; North and Levy 1996; Loeser 2000; Burchiel 2002)

A. Know the general health issues that are relevant to successful surgical procedures.

B. Know the importance of the following in evaluating a patient for surgery:

1. Disease causing pain
2. Life expectancy
3. Adequate trial of nonsurgical management, including physical, pharmacological, and psychological strategies
4. Cancer versus noncancer pain, including the role of cancer in neural injury pain
5. Pain due to injury to the nervous system
6. Role of nerve blocks in patient evaluation
7. Identification and assessment of psychological and environmental factors influencing pain behavior
8. Patient's, family's, and referring physician's expectations of surgical treatment

II. Specific procedures: indications, techniques, and outcomes

A. General (Tasker 1994b; Gybels and Sweet 1989; Burchiel 2002)

1. Be aware of the complications of ablative surgery to relieve pain and of the likelihood of pain recurrence.
2. Be aware of the advantages and disadvantages of percutaneous and open surgical approaches ablative surgery and stereotactic radiosurgery.
3. Be aware of the need for outcomes-based evidence.

B. Peripheral neurectomy (White and Sweet 1969; Aids to the Examination 1986; Tasker 1987; Gybels and Sweet 1989; Loeser et al. 1990; Loeser 1994; Devor and Seltzer 1999)

1. Know the utility of peripheral neurectomy in pain management.
2. Be aware of proposed mechanisms for pain caused by injury to the nervous system including iatrogenic injuries, and the role of neuromas.
3. Know the utility of nerve relocation surgery.
4. Understand the unique features of tic douloureux which usually affects the trigeminal but very rarely the VIIth and IXth cranial nerves.

C. Sympathectomy (Gybels and Sweet 1989; Tasker and Lougheed 1990; Bennett 1994; Hardy and Bay 1995)

1. Know the indications for sympathectomy for pain relief.
   a. Pain of vascular origin
   b. Visceral pain
2. Know how to evaluate a patient by tests of sympathetic function and by use of local or regional anesthesia.
3. Be aware of CRPS types I and II and diagnostic issues.

4. Know available techniques and outcome data.
5. Know how to evaluate the adequacy of a sympathectomy for pain relief.

D. Spinal dorsal rhizotomy including ganglionectomy (Gybels and Sweet 1989, Taub et al. 1995; Taha 2002)

1. Know the indications:
   a. Cancer pain.
   b. Neuropathic pain syndromes.
2. Be aware of the various techniques, open and percutaneous.
3. Know how to interpret the results of nerve blocks in planning spinal dorsal rhizotomy.
4. Know the expected outcomes.

E. Anterolateral cordotomy spinothalamic tractotomy (White and Sweet 1969; Willis 1985; Sweet and Poletti 1994; Tasker 1995)

1. Indications: cancer pain
2. Know the available techniques: open and percutaneous, CT guided, X-ray guided.
3. Understand their relative outcomes with respect to:
   a. Pain recurrence
   b. Complications
   c. The pathophysiology of respiratory difficulties

F. Dorsal root entry zone (DREZ) procedures, spinal and medullary (Nashold et al. 1995)

1. Know the indications:
   a. Plexus avulsion injuries
   b. Postherpetic neuralgia
   c. Spinal cord and cauda equina injuries
   d. Other neuropathic pains
2. Be aware of the techniques of Nashold and Sindou.
3. Know the outcomes data.

G. Commissural myelotomy (Gybels and Sweet 1989; Nauta et al. 2002)

1. Know that the major indication is midline cancer pain in the pelvic area.
2. Be aware of the techniques:
   a. Open
   b. Percutaneous
   c. Cervical or lumbar spinal cord segments
3. Recognize that pain relief may not be restricted to the region of hypalgesia or the somatotopy of the area lesioned.

H. Facet rhizolysis (Bogduk 1988; North et al. 1994)

1. Know the indications.
2. Understand the innervation of the facet joints.
3. Know how to evaluate diagnostic nerve blocks.
4. Be aware of the different techniques under local and general anesthesia with and without physiological localization.
5. Be aware of outcomes data.

I. Operations on the cranial nerve roots (Sweet 1990; Burchiel 1999)

1. Know the indications for:
   a. Tic douloureux (V, rarely IX–X)
      i. Understand how to diagnose tic.
      ii. Know the techniques available for tic:
         (a) Percutaneous radiofrequency (RF) rhizolysis
         (b) Percutaneous glycerol injection
         (c) Microcompression
         (d) Microvascular decompression
         (e) Open V rhizotomy in posterior fossa
         (f) Open IX–X rhizotomy
         (g) Stereotactic radiosurgery
   b. Cancer (rarely): percutaneous RF rhizolysis
2. Be aware of the expected outcomes and recurrence rates.

J. Destructive procedures on the brain and brainstem (Willis 1985; Gybels and Sweet 1989; Jannetta et al. 1990; Bouckoms 1994; Jeanmonod et al. 1994; Sweet and Poletti 1994; Ballantine et al. 1995; Young 2000)

1. Appreciate that the stereotactic approach is probably the chief technique by which such procedures are accomplished.
2. Understand the basic principles of stereotaxis: use of frames, imaging, computer assistance, physiology, and RF lesion-making.
3. Know that cancer pain has been the major indication for these procedures.
4. Be aware of the procedures currently in use:
   a. Stereotactic mesencephalic tractotomy
   b. Stereotactic medial thalamotomy
   c. Stereotactic central lateral thalamotomy
   d. Stereotactic cingulumotomy
5. Be aware of use of stereotactic radiosurgery to make stereotactic lesions in brain and cranial nerve roots.
6. Be aware of anecdotal nature of the outcome data.

K. Neurostimulation techniques (Willis 1985; Levy et al. 1987; Young and Rinaldi 1994; Gybels and Nuttin 2000; Meyerson and Linderoth 2000)

1. Be aware of:
   a. The historical development of neurostimulation techniques
   b. The general principles of stimulation techniques:
      i. Safety principles in the use of chronic stimulation
      ii. The role of test stimulation
      iii. Follow-up and management of the patient with an implanted stimulator
      iv Troubleshooting when stimulation fails
      v. Be aware of the proposed pathophysiological principles thought to be at work in chronic stimulation for the relief of pain
2. Peripheral nerve stimulation
   a. Know the indications: neuropathic pain
   b. Techniques and equipment available
   c. Outcomes data

3. Spinal cord stimulation
   a. Know the indications.
      i. Neuropathic pain
      ii. Pain of degenerative disc disease and failed back surgery syndrome
         (a) Leg pain
         (b) Low back pain
   b. Know the cord stimulation sites for treating pain in different parts of the body.
   c. Recognize the need to produce paresthesia in the region of pain.
   d. Techniques:
      i. Open with insertion of plate-type electrodes.
      ii. Percutaneous: be aware of the different electrode arrays available and their proposed indications.
      iii. Be aware of the two basic methods of chronic stimulation: radiofrequency-coupled and totally implantable and programmable.
4. Deep brain stimulation (DBS)
   a. Be aware that there are two basic DBS techniques, paresthesiae-producing and medial stimulation.
   b. Be aware of the suggested rationale for each.
   c. Know the indications.
      i. Neuropathic pain
      ii. Failed back surgery syndrome
      iii. Cancer and other nociceptive pain
   d. Be aware of the equipment available (similar to that for spinal cord stimulation).
   e. Be aware of outcomes data and difficulties of outcome assessment.
5. Cortical stimulation (Tsubokawa al. 1991; Mertens et al. 1999)
   a. Techniques and complications
   b. Indications
   c. Outcomes

L. Epidural spinal and intrathecal opioid administration (Cousins and Mather 1984; Garber and Hassenbusch 2002; Gybels and Sweet 1989; Lenzi et al. 1995)
   1. Know the indications:
      a. Cancer pain
      b. Noncancer pain
   2. Understand the physiological basis (Chapter 5).
   3. Know how to use test-dosing.
   4. Be aware of techniques, routes, and complications.
      a. Intraspinal:
         i. Epidural
         ii. Intrathecal
      b. Intraventricular
      c. Implanted pumps and external pumps
   5. Understand the determination of dosage of opiate and its continued administration, the management of the equipment, and how to troubleshoot problems.
   6. Be aware of other drugs that can be utilized in addition to opiates.
   7. Understand outcomes data.

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