Sympathetic ganglion block: surgical, chemical and radiofrequency blocks have been used for many years, especially in the treatment of Reflex Sympathetic Dystrophy (RSD, now termed CRPS I, Complex regional pain syndrome Type I).

Sympathectomy involves injection of local anaesthetic +/- steroid (e.g. prednisolone) into a ganglion, which is essentially a region where there is a collection of sympathetic nerves.

One of these is the Stellate Ganglion, in the neck, which is sometimes blocked to relieve orofacial pain, such as trigeminal neuralgia. If pain is "sympathetically maintained" (SMP) then a nerve block might be able to temporarily relieve it; however, if it has spread and become centralised (i.e. originates in the central nervous system) then it is not amenable to this form of treatment: sympathetically independent pain (SIP) does NOT respond to nerve blockade.

Sympathetic blockade may also be used to relieve circulatory problems such as Raynaud's or for treatment of hyperhidrosis (excessive sweating).

Somatic nerve block: peripheral nerve entrapment problems can lead to chronic pain in various parts of the body. Generally, these pains are termed "neuralgia".

Examples include: occipital neuralgia (at the back of the head); abdominal cutaneous nerve entrapment syndrome (secondary to surgery/trauma/pregnancy); ilioinguinal nerve: linked to pelvic pain and has been successfully treated in women([1])

In trigeminal neuralgia (TGN), a procedure called rhizotomy may be carried out using glycerol but repeats of this procedure are frequently unsuccessful in primary TGN. In TGN secondary to Multiple Sclerosis, the recurrence rate of pain is even higher.

'Permanent' Nerve Blocks:

Note: due to the plasticity of the nervous system, it is now recognised that nerve blocks are not permanent.

Ethanol (alcohol) has been widely used in neurolytic procedures. Concentrations from 3-100% may be used. It destroys nerves by extracting cholesterol and other lipids (fats) and by protein precipitation. However, axonal regeneration is possible (unless the cell body is destroyed). High concentrations of alcohol (90-100%) may produce a chemical neuritis.

Phenol: Animal studies([2]) show that phenol (carbolic acid) at 6% concentration causes local necrosis in 24 hours, complete degeneration by 45 days and regeneration in 75 days. Sensory recovery after phenol is faster than after alcohol.

The State of Colorado guidelines (xxv) state clearly that "neuroablative procedures have no proven value in the treatment of nonmalignant chronic pain because of the high risk of developing a deafferentation pain syndrome."

Hanekop et al ([3]) stated

"The only neurolytic procedure which still has some importance is the neurolysis of the celiac ganglion for alleviation of pain in the upper abdomen mostly due to pancreatic cancer.

This approach seems to be highly effective and tends to be afflicted with only minor complications.

Other neurolytic blocks have shown solely local and temporal efficacy. In their majority they are unprecise and often accompanied by severe complications."

They further commented:

"Where suitable, the use of neurolytics is replaced by radiofrequency thermocoagulation, to a lesser degree by cryoanalgesia. Both procedures normally do not yield better analgesia, but do result in fewer complications."

Donner et al ([4]) wrote in 1998 that

"Repetitive nerve blocks as a monotherapeutic treatment are losing importance in the therapy of chronic pain."

Adverse effects of nerve blocks:

- Nerve damage: direct neurotoxicity from local anaesthetic, especially from preservatives such as sodium metabisulfite; mechanical trauma damage. Leakage from intended injection site.
- Vascular injury: puncture of blood vessels
- Pneumothorax (air in chest cavity)
- Other tissue trauma: kidney damage if lumbar area; bowel; etc.
- Dural puncture and direct intrathecal injection: note neurotoxicity of local anaesthetics!; post-dural puncture headache: severe, sometimes treated with epidural blood patch which is highly irritant and can cause arachnoiditis.
- Backache
- Unintentional spread of local anaesthetic: epidural spread has been recorded with brachial plexus, facet joint injection and intercostal (between ribs) block. This can be disastrous if it involves neurolytic agents.

Systemic toxicity of local anaesthetics includes allergic reaction and cardiovascular effects such as heart arrhythmias.

Common complaints include: tinnitus, light-headedness, metallic taste, numbness around the

mouth: these occur at lower plasma levels such as 3-5 mcg/ml. More serious effects such as muscle twitching or decreased consciousness may signal the onset of seizures or coma.

Risk of toxicity relates to: dose administered, vascularity (blood vessels) at the injection site, use of epinephrine in the preparation and the choice of drug (lidocaine is more toxic than bupivicaine)

Injection sites near the head (such as stellate ganglion block) need to be performed with considerable care to avoid injection into blood vessels: as little as 2-3 ml of anaesthetic can precipitate a seizure.

Other problems with sympathetic blocks include changes in heart rate, pupil response to light/dark,(usually have small pupils) loss of sweating in the area served by the relevant nerve and/or increased sweating in other areas, changes in blood flow.

Horner's syndrome may occur after a stellate ganglion block manifesting with a small pupil on the affected side, a droopy eye and loss of facial sweating.

Hongo et al. ([5]) looked at 41 patients treated with epidural neurolysis using 50 % ethyl alcohol 2 ml. 38 suffered from cancer pain and three patients were complaining of chronic benign pain.

On average the block was repeated 2.3 times in each patient.

Follow up in 30 of the patients revealed that 47% reported 70% or greater pain relief and 20% reported around 50% relief; duration of relief was on average 54 days. Notably some 43% of patients reported adverse effects, the most common of which was pain after the block was performed.

Radiofrequency Neurolysis (Ablation) (RF)

RF uses radiofrequency waves to shake up charged chemical particles (ions) within the nerves, thus producing heat, which is allowed to reach approximately twice the body temperature for 60-90 seconds.

This technique appears to produce a longer-lasting pain relief than chemical nerve blockade, and there is not the risk of spread of the chemical.

Radio-frequency nerve blocks have been beneficial in the following conditions:

- Intractable back pain
- headaches and facial pain, trigeminal neuralgia*
- neck, arm and shoulder pain
- chest wall pain
- CRPS

(* percutaneous stereotactic radiofrequency rhizotomy PSR)

Some centres insist on selection criteria to include previous good response to local anaesthetic blocks.

The procedure tends to block nerve function for 6-9 months (may be only 3 months or up to 18 months)

It is performed under fluoroscopic control and does not require general anaesthetic.

Local anaesthetic is injected into the area as part of the procedure to ensure the correct nerve is being treated. (and also to numb the tissues through which the RF needle is passed)

Dr. Gatell of the Atlanta Pain Relief Centre has used this technique. He warns

"however, each individual case may not respond with 100% pain relief, and pain may recur or even become worse (Anesthesia Dolorosa). So RF is best reserved as a last resort in treating intractable chronic painful conditions that have not responded to optimal medical pain therapy."

Yoon et al. at the Walton Centre in Liverpool ([6]), conducted a retrospective analysis of long-term efficacy of percutaneous radiofrequency thermocoagulation of the trigeminal ganglion or root for the relief of trigeminal neuralgia.

They looked at 81 cases. Initial success rate was 87%; the probability of remaining pain-free 1, 2 and 11 years after the procedure was 65, 49 and 26%, respectively. Patients who had typical symptoms and no previous surgery did best.

Adverse events included dysaesthesia in 20 patients, corneal numbness in 12 patients and masseter weakness in 3 patients.

Dutch doctors in Maastricht ([7]), evaluated the use of radiofrequency for stellate ganglion blockade used in chronic pain syndromes in which the sympathetic nervous system is thought to be involved.

They reviewed 86 RF-SG procedures and conducted a Medline literature review search on SG blockade. IN their clinic, they found that 39.5% of 221 patients who had received a prognostic SG block subsequently underwent RF-SG. 40.7% had a greater than 50% reduction in pain whilst 54.7% reported no improvement and 4.7% had worsened pain.

Literature search revealed partial pain relief in 41.3% of patients, complete relief in 37.8% and no relief in 20.9%.

They concluded:

"Our retrospective study shows that an RF-SG block is most likely to be of benefit for patients suffering from complex regional pain syndrome type 2, ischemic pain, cervicobrachialgia, or postthoracotomy pain. Clinical efficacy remains to be proven in a randomized controlled trial, however."

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