From the Book:

Chronic Pain: Reflex Sympathetic Dystrophy Prevention and Management

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CAUSE OF FAILURE AFTER SYMPATHECTOMY

1. Sympathectomy is analogous to the act of killing the messenger. The sympathetic nervous system has the critical job of properly controlling and preserving the circulation in different parts of the body, especially in the extremities. By paralyzing the system, the extremity will be more apt to have disturbance of circulation and is left unprotected from fluctuation in circulation.

Sympathectomy is similar to permanently removing the central heat and air-conditioning system and never replacing it because of malfunction.

Sympathectomy permanently damages the temperature regulatory system. The reason sympathectomy does not cause side effects other than ineffective control of pain as well as impotence and orthostatic hypotension is because it is invariably partial and incomplete.

2. Even after "complete" removal of the sympathetic plexus for the upper or lower extremities, the sympathetic nerves in the wall of the blood vessels are left intact.

3. As shown in Table 6, the most common form (over 80%) of RSD is disuse RSD. In this situation, the sympathetic system is temporarily hyperactive. Proper conservative treatment would prevent any unnecessary invasive surgery (such as sympathectomy) in such patients.

4. Usually the patients that end up needing sympathectomy are the ones who suffer from ephaptic dystrophy. Sympathectomy in such cases a classic Cannon phenomenon. This physiological phenomenon refers to the fact that the end organ that is controlled by sympathetic nerve fibers will become uninhibited in its chemical dysfunction. As a result, even though the sympathetic fibers are not contributing to acetylcholine or become uninhibited with resultant increase of pain input.

In diabetic neuropathy RSD, sympathectomy dramatically relieves the pain for the first 1 to 3 years. Then deafferentation can Cannon phenomenon set in. As a result, invariably by the second to fifth year the patient ends up with a lot more pain. Sympathetic blocks repeated every 6 to 12 months yield similar results.

In patients who have had sympathectomy, thermography shows an increase of temperature in the focus of ephaptic nerve damage (Cannon phenomenon) with secondary increase of pain and discomfort.

5. There is a significant overlap in the border areas of sympathetic nerve dermatomes. As a result, the adjacent intact sympathetic nerves try to overcome the lack of sympathetic input. This contributes to the failure of long-term effects of sympathectomy.

6. Whereas the neiospinothalamic tract is quite consistent in its anatomical pattern, the sympathetic nerves and plexi are phylogenetically old, and show a marked individual variability in humans. This causes a problem at the time of surgery and results in the gray rami branching off and entering in a few adjacent areas of the sympathetic paravertebral chain. As a result, the removal of part of this chain does not guarantee a "complete" sympathectomy.

7. The sympathetic nervous system functions symmetrically and bilaterally. So the removal of a portion of this system on one side does not achieve a "total sympathectomy.

8. At times when patients undergo lumbar sympathectomy, we have noted that they may develop Horner's syndrome on the same side or marked vasoconstriction of the hand on the same side, reflecting the complex and primitive connections of the sympathetic nervous system. Cooper has shown vasoconstriction in the hand during electrical stimulation of the lumbar sympathetic chain. We have noted development of *de novo* RSD in the ipsilateral hand in two patients after lumbar sympathetic block.

9. Repeated sympathectomies are no guarantee of success.

10. Another side effect of sympathectomy is that the patient loses motivation for physiotherapy and exercise. Because sympathectomy results in immediate relief in the first few months, the patient has less inclination or motivation to exercise and help improve the circulation of the extremity.

11. Even in the cases of rare and severe major causalgias, it makes more sense to resort to a morphine pump than to sympathectomy.

The application of sympathectomy in management of RSD should be strongly discouraged. If the patient suffering from RSD has a short life expectancy(less than 5 years), then sympathectomy makes sense and should be done.

TABLE 40

FACTORS CONTRIBUTING TO SYMPATHECTOMY FAILURE

Sympathetic nervous system is bilaterally and symmetrically innervated. Unilateral sympathectomy cannot be complete.
Bilateral sympathectomy has too many side effects (e.g., hypotension, impotence).
SNS is anatomically primitive and structurally inconsistent. Amoebic-type connections of the ganglia makes "total sympathectomy" impossible.
Overlapping SNS thermatomal innervation results in postsympathectomy regeneration.
Cannon's phenomenon (topical noradrenergic autonomy) at the area of ephapse perpetuates the postsympathectomy pain.
Spread of RSD to adjacent structures results in new manifestations of RSD in remote areas, e.g., Horner's syndrome or de novo RSD of hand after lumbar sympathectomy.
The permanent destruction of thermoregulatory function of SNS causes latent complications, e.g., RSD in contralateral extremity.
War and peace RSD and war and peace medical(e.g., dibenzyline treatment results in Lebanese war) and surgical results are not identical and comparable.
The war casualties are more likely to be stress-induced analgesia (SIA) than peacetime trauma (e.g., a work injury is more likely to be stress-induced pain- SIP - because of legal complications). SIA pain responds better to treatment.
Repeated sympathectomies are invariably doomed to fail.