

Title: THE TREATMENT OF REFLEX SYMPATHETIC DYSTROPHY WITH INTRAVENOUS REGIONAL BRETYLIUM

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INTRODUCTION: Reflex Sympathetic Dystrophy (RSD) is a chronic pain disorder that may occur in a previously injured extremity, and is often accompanied by allodynia, vasomotor disturbances, trophic changes, swelling and delayed recovery. The mechanism is thought to be an abnormal reflex mediated via the sympathetic nervous system (SNS). RSD is often refractory to conservative treatments and pharmacological blockade of the SNS may become the major form of treatment. Hannington-Kiff introduced intravenous regional sympathetic block (IRSB) utilizing Guanethidine (G) in 1974 and many studies since that time have demonstrated beneficial results with both G and reserpine (R).¹ Studies have suggested a better response to IRSB than with traditional sympathetic blocks. The better response is attributed to a more prolonged blockage by the intravenous regional technique. Bretylium Tosylate (B) is an adrenergic blocking agent with similar actions to G and R including accumulation in adrenergic nerves, inhibition of response to adrenergic nerve stimulation and blockage of norepinephrine release and uptake. Important differences include: less initial sympathomimetic effects with less burning on IV injection, less gastrointestinal side effects, and the potential for significantly less central nervous system side effects than R since B does not cross the blood brain barrier because of its quaternary ammonium form. Also, unlike G and R, B is approved for intravenous use in the United States.² Based on pharmacological similarities, it was predicted that B would be effective for IRSB in the treatment of RSD, with possibly less side effects. Thus, we decided to use B in patients when the intravenous regional technique was the appropriate choice for treating RSD.

METHODS: Our experience with four selected patients with RSD based on traditional diagnostic criteria and temporary, but inadequate response to stellate or lumbar paravertebral sympathetic blocks along with unresponsiveness to conservative treatment was reviewed after treatment with IRSB with B. An IRSB was performed after informed consent and IV access was secured. A double tourniquet was placed as high as possible on the involved extremity. The extremity was elevated and tightly wrapped with an Esmarch bandage to produce exsanguination. The upper section of the tourniquet was inflated to 300 torr for the arm and 500 torr for the leg. The extremity was subsequently unwrapped and lowered. B in a dose of 1 mg/kg diluted in 50 cc's of 0.5% lidocaine for the upper extremity and 100 cc's of 0.5% lidocaine for the lower extremity with 500 units of heparin was injected slowly over 2 minutes through the previously inserted IV. After 30 minutes the tourniquet was deflated. Blocks were repeated approximately every 4 weeks if pain returned and the patient had good pain relief after each prior treatment. Skin

temperatures were measured in two of the patients. **RESULTS:** Four patients had a total of 19 IRSB's. One patient had only 3 blocks and remained pain free at 7 months follow-up. The most blocks were 7 in one patient who had excellent pain relief at 60 day follow-up after the last procedure. There were no episodes of hypotension, syncope or burning on IV injection. There were two episodes of transient dizziness with cuff deflation in two different patients. These same patients had other IRSB's without this side effect. All patients had good to complete pain relief for days to weeks following the initial block and excellent to total pain relief for weeks to months after subsequent blocks. Patients who had longer relief from the initial IRSB required less frequent treatments and less total number of treatments. Two of the patients demonstrated significant increases in the skin temperature of the involved extremity two days after the procedure (approximately 3°C).

CONCLUSION: We have presented four patients with RSD who had long term follow-up and good to total pain relief following IRSB with B. Adverse effects were minimal, with no long term adverse effects during treatment or follow-up. Objective signs of sympathetic blockade were manifested by increased skin temperatures in two patients after the period of hyperemic response to tourniquet inflation and deflation. The beneficial short term pain relief with B used in this technique could be attributed to tourniquet induced analgesia as described by Brown and later by Ramanathy, but this would not explain the long term pain relief.^{3,4} The lidocaine used to dilute B to avoid tourniquet pain and burning on IV injection could be implicated as the beneficial agent, but is unlikely since McKain⁵ demonstrated no long term sympatholytic effect from lidocaine alone or normal saline alone when used in this technique. The lidocaine may be the cause of the mild transient dizziness during cuff deflation but this remains to be demonstrated. We recommend IRSB with B 1 mg/kg as a treatment for RSD since it appears to be beneficial for pain relief in RSD with minimum side effects and is readily available for intravenous use. Continuous, comparative, long-term studies of B, G and R are needed to further evaluate the efficacy of these agents in this technique.

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