Title: Perispinal Delivery of CNS Drugs
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The conclusion that Corning's 1885 cocaine injections were perispinal interspinous injections posterior to the ligamentum flavum is based on the details included in Corning's publications(1-5):

1. Corning stated his intent to avoid "wounding" the spinal cord with the needle and place the cocaine "between the spinous processes(1-5);
2. Corning's intent was to have cocaine delivered so that it "would be rapidly absorbed by the minute ramifications of [the numerous small veins (venae spinosae) [that] run down between the spinous processes of the vertebrae]…."(1, 2);
3. Corning subtracted "2 or 3 millimeters" from what he estimated to be the approximate posterior boundary of the "foramen vertebrae" in calculating the depth of needle injection(3-5); [1]
4. Corning utilized a dose of cocaine (about 120mg)(6) that was much higher than the intrathecal doses used by Bier (10-15mg) (7) and Tuffier(8), yet the onset of analgesia was slower and the level of spinal anesthesia lower than that achieved by Bier and Tuffier with their much lower intrathecal dose(6) (as calculated by Marx, who concluded that Corning's injection was "extradural"(6));
5. Corning injected about 4 ml. of 3% cocaine solution between the spinous processes in his 1885 experiment(1) and later increased this to 6.2 ml. ("100 minims")(3-5), larger volumes and amounts delivered than those injected intrathecally by Bier (0.5-3.0 ml. doses of 0.5-1.0% cocaine solution for delivery of a total dose ranging up to 15mg)(6, 9);
6. From his description and drawings(3-5), one assumes that Corning's injection needle was 3 inches long; measuring the location of the nut from the figures provided (**Figure 8** (3)), the depth of needle delivery would have been 1.25 inches (3.175 cm). This is too shallow to penetrate the ligamentum flavum in the thoracic spine of an adult, where the depth of the epidural space is generally greater than 4 cm.(10, 11).

[1] Corning appeared to have [mistakenly] equated the distance from the surface of the skin to the "spinal canal" (Corning 1897) ("foramen vertebrae" (Corning 1888)) with the distance from the surface of the skin to the spinal cord, without accounting for the depth of the epidural space.

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