Kirschner wires or K-wires or pins are sterilized, sharpened, smooth stainless steel pins. Introduced in 1909 by Martin Kirschner, the wires are now widely used in orthopedics and other types of medical and veterinary surgery. They come in different sizes and are used to hold bone fragments together (pin fixation) or to provide an anchor for skeletal traction. The pins are often driven into the bone through the skin (percutaneous pin fixation) using a power or hand drill. They also form part of the Ilizarov apparatus.

A total of 60 human cadaveric lumbar pedicles were studied. Three different screw insertion techniques were compared: (A) Jamshidi needle and Kirschner wire without tapping; (B) Jamshidi needle and Kirschner wire with tapping; and (C) sharp-tipped screw insertion. Pullout tests were performed at a displacement rate of 10 mm/min recorded at 20 Hz. Mean values of these parameters were compared using paired t-tests (left vs right in the same specimen): A vs B, A vs C, and B vs C. Additionally, 3 L1-L5 spine models were used for timing each screw insertion technique for a total of 10 screw insertions for each technique. Insertion times were compared using a 1-way analysis of variance.

Results: The mean pullout force for insertion technique A was 1462.3 (597.5) N; for technique B, it was 1693.5 (805.0) N; and for technique C, it was 1319.0 (735.7) N. There was no statistically significant difference in pullout force between techniques (P > 0.08). The average insertion time for condition C was significantly less than that for conditions A and B (P < 0.001).

Conclusions: The pullout force of the novel sharp-tipped screw placement technique is equivalent to that of traditional techniques. The sharp-tipped screw placement technique appears biomechanically viable and has the advantage of saving time during insertion.

Clinical relevance: Single-step screw placement using high-resolution 3-dimensional navigation has the potential to streamline workflow and reduce operative time ¹⁾.

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de Andrada Pereira B, O'Neill LK, Sawa AGU, Zhou JJ, Wangsawatwong P, Lehrman JN, Godzik J, Oldham AJ, Turner JD, Kelly BP, Uribe JS. Biomechanical Assessment of a Novel Sharp-Tipped Screw for 1-Step Minimally Invasive Pedicle Screw Placement Under Navigation. Int J Spine Surg. 2023 Apr 19:8470. doi: 10.14444/8470. Epub ahead of print. PMID: 37076254.

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