The nonpenetrating titanium clip has been successfully used in peripheral arterial bypass surgery. The purpose of this study was to evaluate the leakage pressures and patterns of nonpenetrating titanium clips using a simple model that mimicked spinal surgery. In addition, the authors describe their surgical experience with these clips and the follow-up results in 31 consecutive patients. METHODS: The authors compared nonpenetrating titanium clips and expanded polytetrafluoroethylene (ePTFE) sutures in relation to the water pressure that could be tolerated by sutured ePTFE sheets, and the leakage pressure patterns were determined. The changes in leakage pressures at 5 minutes, 30 minutes, and 12 hours were examined when the clips and sutures were used in combination with the mesh-and-glue technique in an in vitro study. Thirty-one patients underwent spinal intradural procedures using nonpenetrating titanium clips to suture the dura maters using the meshand-glue technique, involving fibrin glue and polyglycolic acid-fibrin sheets. RESULTS: A significant difference was apparent between the ePTFE suture group and the nonpenetrating titanium clip group, with the latter showing a leakage pressure that could be sustained and was 1508% higher than that of the former ($p = 0.001$). In relation to leakage patterns, the nonpenetrating titanium clips did not make any suture holes in the ePTFE sheet and fluid leakage occurred between the clips, whereas fluid leakage was associated with the pressure elevation that occurred at the suture holes made by the ePTFE sutures. Of the 31 patients who underwent spinal intradural procedures using nonpenetrating titanium clips, 1 (3.2%) experienced cerebrospinal fluid (CSF) leakage postoperatively. No other complications-for example, allergic reactions, adhesions, or infections–were encountered. CONCLUSIONS: The interrupted placement of nonpenetrating titanium clips enables dural closure without creating any holes. These clips facilitate improvements in the initial leakage pressure and reduce postoperative CSF leakage following spinal surgery. The authors conclude that it is very beneficial to suture the spinal dura mater using nonpenetrating titanium clips given the anatomical characteristics of the spinal dura mater and the fact that the clips do not create suture holes [1].

1)

Ito K, Aoyama T, Horiuchi T, Hongo K. Utility of nonpenetrating titanium clips for dural closure during spinal surgery to prevent postoperative cerebrospinal fluid leakage. J Neurosurg Spine. 2015 Dec;23(6):812-9. doi: 10.3171/2015.3.SPINE141215. PubMed PMID: 26315957.