

## Routinely placing drainage tube in patients with anterior cervical surgery: is it really necessary?

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With the acceleration of the aging and change of work and living habits across the world, cervical spondylopathy has become more prevalent, bringing enormous economic burden and medical cost pressure to both societies and governments.<sup>[1]</sup> At present, conservative treatment is usually used in the early stages of the condition whilst surgical intervention is employed to treat patients with severe radicular symptoms and spinal cord compression. These surgical therapies include anterior cervical spine surgery (ACSS) including both anterior cervical corpectomy and fusion, anterior cervical discectomy and fusion, and artificial cervical disc replacement, which is the most widely used technique since it was proposed in 1955.<sup>[2]</sup> The popularity of ACSS is advantageous due to minimal trauma and low bleeding observed in patients and can directly remove the compression caused by herniated discs and osteophytes. Nevertheless, since the deep gap front cervical vertebral body is small and adjoins the trachea, the postoperative hematoma is one of the most important complications in ACSS, resulting in dyspnea and can even threaten the lives of patients.<sup>[3]</sup> Thus, it is conventional to place a drainage tube when performing ACSS, which is conducive to emptying the bleeding from within the wound cavities and reducing the incidence of postoperative hematoma.

Despite the advantages of inserting a drainage tube in ACSS, there are some drawbacks, especially in terms of imposing restrictions on the development of enhanced recovery after surgery (ERAS) which was firstly proposed by Kehlet and coauthors<sup>[4]</sup> in 1997, a view which is still respected by many scholars worldwide today. First, the patients with drainage tubes may need to bed rest for around 1 to 3 days post-surgery, which can result in complications such as low back pain, urinary tract infections, and deep vein thrombosis.<sup>[5]</sup> Second, the insertion of a drainage tube may cause localised pain and

scars in the placement area after surgery. Moreover, patients are prone to feelings of fear and anxiety in the drainage tube removal process during the perioperative period, thereby reducing the patient's overall experience and satisfaction levels.<sup>[6]</sup> Therefore, placement of drainage is less beneficial in comparison to orthopedic “no drainage” concepts, which in turn is a vital part of the implementation of ERAS in the orthopedic departments.

In addition to the disadvantages observed with drainage, with the improvement of surgical techniques and advances in hemostasis materials, it has been accepted that modern operation times and intraoperative blood loss of ACSS has significantly decreased, as has the incidence of postoperative hematoma, in comparison to historical procedures. This provides the theoretical possibility, and increased safety for not inserting a drainage tube, thus providing us with new way of thinking that it may not be essential to insert drainage in ACSS patients. In order to confirm the feasibility of ACSS without drainage, we retrospectively analyzed the drainage volumes of 92 patients with drainage at normal pressure following single- or double-level ACSS in West China Hospital of Sichuan University from 2016 to 2017. The results indicated that in the case of sufficient hemostasis, 83.7% of patients' postoperative drainage volume was less than 10 mL, whilst 94.6% produced volumes more than 30 mL. According to an expert consensus on the implementation of ERAS in ACSS,<sup>[7]</sup> the current standard drainage volume to removing tubing stands at less than 50 mL/day. Therefore, most of the above-mentioned patients theoretically reached the standard of “no placement of drainage”.

Subsequently, we analyzed the data and concluded the key points of not inserting a drainage tube in ACSS (Figure 1). On one hand, preoperative clinical characteristics of patients such as poor-control hypertension, weakened

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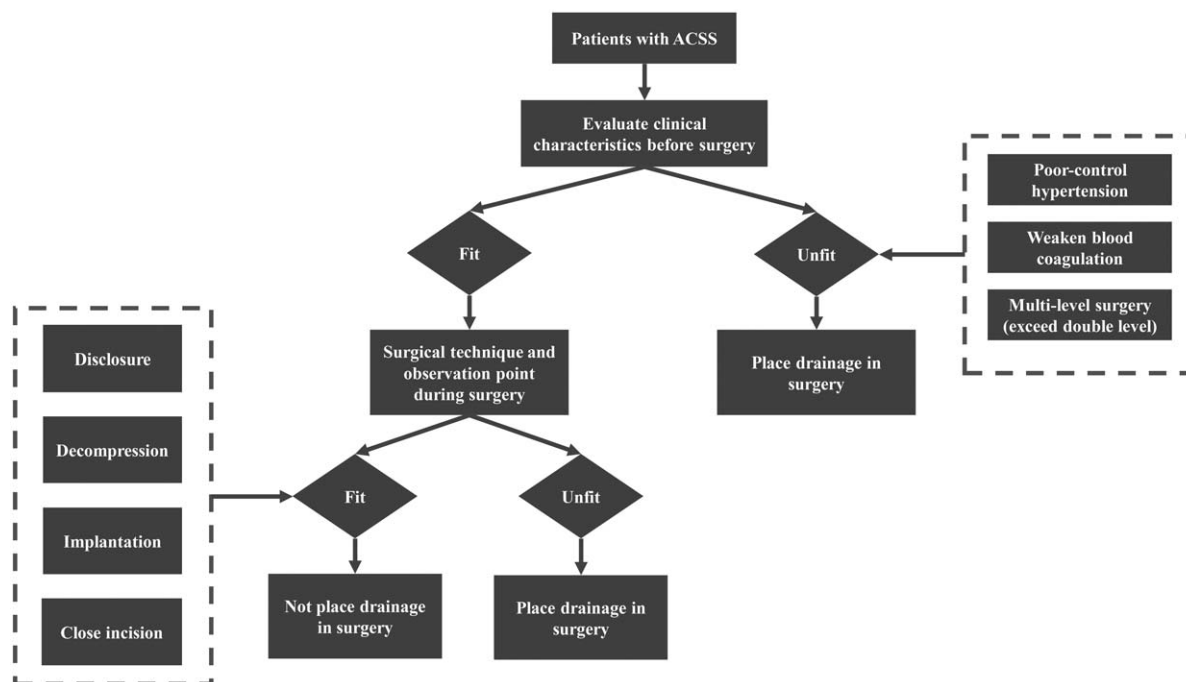
DOI:  
10.1097/CM9.0000000000001253

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Chinese Medical Journal 2021;134(5)

Received: 22-05-2020 Edited by: Qiang Shi and Xin Chen



**Figure 1:** The flowchart of evaluation of not placing drainage in ACSS. ACSS: Anterior cervical spine surgery.

blood coagulation, and multi-level surgery (exceeding double levels) are closely associated with increased postoperative drainage volumes, indicating that drainage should be placed in during surgery, a fact which should be noted before surgery. On the other hand, postoperative drainage volume in ACSS also depends on the surgical techniques and observations made by the surgeon(s) during operations. The main points regarding surgical techniques and observations were also made and could be seen as Best Practice. 1) Exposing the vertebral body through the intermuscular space using sharp dissection and avoiding excessively pulling a muscle, helps ensure no significant bleeding during the process of the disclosure. 2) Verify that there is no active bleeding or oozing of blood within the spinal canal and around implants after completing the process of decompression and implantation. 3) Ensure careful hemostasis and ensure that 1 to 2 minutes of observations are carried out following suturing of the longus colli, and wash the surgical zone with saline. 4) When the platysma has been sutured, reconfirm whether there is any active bleeding or oozing of blood before closing the incision. Notably, it is also necessary to place the drainage in when the operation takes more than 2 h if occurs cerebrospinal fluid leakage occurs.

Furthermore, according to the aforementioned key points, since 2018, Professor Hao Liu’s team had stopped placing drainage tubes in patients during single- or double-level ACSS. In May 2020, we retrospectively collected and analyzed clinical data from 488 patients with the same baseline levels. A total of 236 patients underwent the “no drainage tube” ACSS, and none of them showed postoperative hematoma, highlighting this procedure may be safe, and it may be feasible cease placing drainage in ACSS patients if their postoperative drainage volumes are accurately evalu-

ated. In addition, the clinical data of patients both with and without drainage were compared to each other. Although there were no significant differences in postoperative neurological functions and the incidence of dysphagia between the two groups, the time taken to get out of bed and be discharged from hospital care was significantly shorter in patients without drainage tubes compared to those with tubes inserted. However, the current standard we used to evaluate the placement of drainage in ACSS is still empirical and difficult to generalize. In addition, ACSS without drainage requires high levels of surgical technique and experience, which is not suitable for beginners.

In conclusion, based on these retrospective studies, there is sufficient evidence to suggest that not placing drainage in ACSS patients is safe and feasible under meticulous manipulation and strict evaluation of the patient’s postoperative drainage volumes. Moreover, patients without a drainage tube have significantly shorter bed rest and hospitalization periods, feel less pain and physical and psychological stress, have better experiences, and report higher satisfaction levels during the perioperative period. However, multi-factorial analysis of the influencing factors relating to postoperative drainage volume in ACSS should be undertaken in the future studies.

**Funding**

This work was supported by grants from the Sichuan Province Science and Technology Support Program of China (No. 2019YFQ0002), the Sichuan Province Science and Technology Support Program of China (No. 2018SZ0045), the West China Nursing Discipline Development Special Fund Project, Sichuan University (No. HXHL19016), and the Sichuan Province Science

and Technology Support Program of China (No. 2018SZ0042).

### Conflicts of interest

None.

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**How to cite this article:** Liu Y, Meng Y, Liu H, Shuai WB, Ding C, Wang BY, Yang Y, Hong Y. Routinely placing drainage tube in patients with anterior cervical surgery: is it really necessary? *Chin Med J* 2021;134:521-523. doi: 10.1097/CM9.0000000000001253