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Technical Notes

Investigation of long lateral mass screw insertion torque

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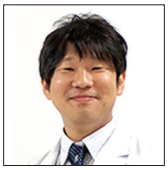

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ABSTRACT

Background: Here, we assessed a new trajectory and insertion torque for the placement of a long lateral mass screw (LLMS) that offers stronger posterior fixation versus a shorter lateral mass screw (LMS) in the posterior cervical spine. We report a short technical note of the insertion torque of LLMS.

Methods: The insertion trajectory/torque was evaluated in 30 patients (10 males and 20 females) undergoing posterior cervical LLMS fusions (2021–2023). Patients averaged 65 years of age. Pathology included eight cervical spine injuries, ten cord injuries, four dislocations/fractures, and eight other entities. Variables studied included the length of the LLMS inserted from C3–7, screw deviation rates, insertion torque, and adverse events.

Results: A total of 146 screws were inserted: 11 pedicle screws (PSs) and 135 LLMS. The average insertion torque was 105.9 cNm for PS and 64.9 cNm for LLMS. As the screw lengthened by 1 mm, the insertion torque increased by approximately 4.4 cNm.

Conclusion: Here, we documented that the insertion torque of LLMS was 66.1 cNm, greater than the 51.0 cNm for LMS, which should provide stronger posterior cervical fixation.

Keywords: Cervical, Insertion torque, Lateral mass screw

INTRODUCTION

Here, we report a new trajectory and technique for the placement of a long lateral mass screw (LLMS) versus a Lateral mass screw (LMS) that should facilitate stronger posterior cervical spine fusion.[4] We report a short technical note of the insertion torque of LLMS.

MATERIALS AND METHODS

We evaluate the trajectory and insertion torque for placing LLMS in 30 patients (10 males and 20 females) undergoing posterior cervical spine fusion (2021–2023); patients averaged 65 years old. Pathologies addressed included eight cases of cervical spine injuries, ten cord injuries, four dislocations/fractures, and eight other cases. Variables studied included screw length, insertion torque, screw deviation rate, and adverse events.

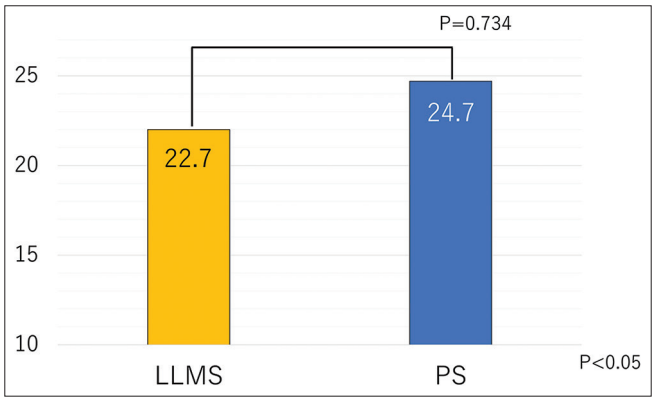

Figure 1: Screw length (mm). LLMS: Long Lateral mass screw, PS: Pedicle screw

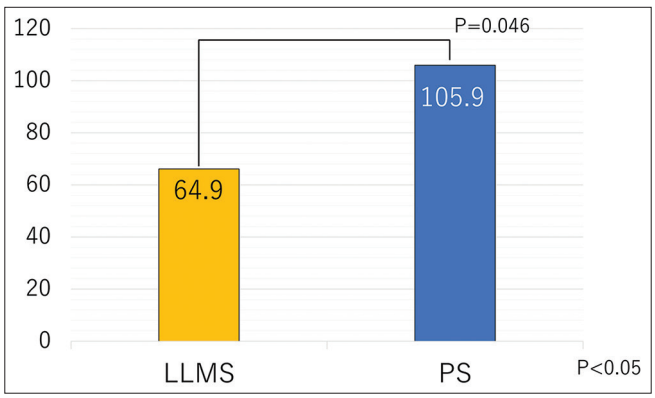

Figure 2: Insertion torque (cNm). LLMS: Long Lateral mass screw, PS: Pedicle screw

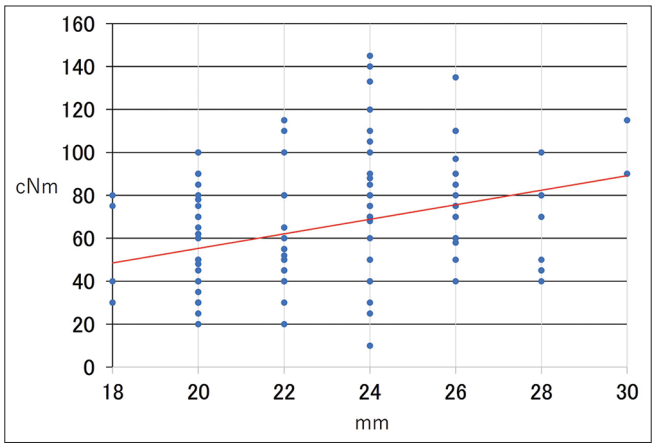

Figure 3: As the screw lengthened by 1 mm, the insertion torque increased by approximately 4.4 cNm.

RESULTS

A total of 146 screws were inserted' 11 pedicle screws (PS) and 135 LLMS. The average screw length was 24.7 ± 1.4 mm (22–26 mm) for PS and 22.0 ± 2.5 mm (18–30 mm) for LLMS (P = 0.74) [Figure 1]. The average insertion torque was 105.9 cNm for PS and 64.9 cNm for LLMS [P = 0.04] [Figure 2]. The insertion torque increased with longer screws with a positive correlation [Figure 3]. The rate of Grade 2 or higher deviations in screw was 9.1% (1/11) for PS and 3.7% (5/135) for LLMS [Figures 4 and 5]. There were no adverse events [Table 1].

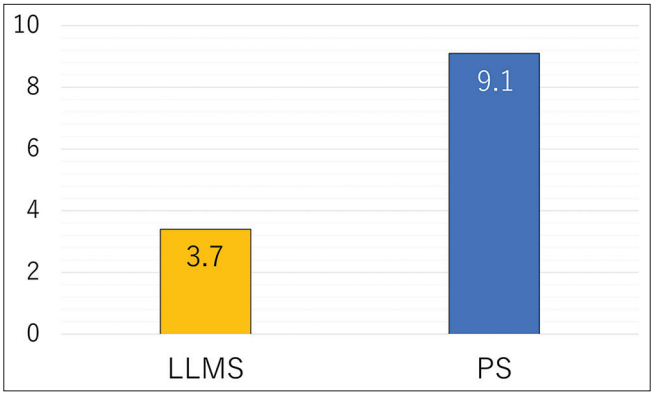

Figure 4: Deviation rate (%). LLMS: Long Lateral mass screw, PS: Pedicle screw.

Table 1: LLMS versus PS results.

	PS	LLMS
Screw length (mm)	24.7±1.4	22.0±2.5
Insertion torque (cNm)	105.9	64.9
Deviation rate (%)	9.1	3.7
Adverse events	None	None

PS: Pedicle screw, LLMS: Long lateral mass screw

DISCUSSION

PS has a good posterior cervical fixation, but if it deviates, there is a risk of major complications (i.e., range 1.2–18.2%) even with navigation.[3] Our LLMS deviation rate was 35 cases (6/183 screws or 3.2%); none resulted in a vertebral artery or spinal cord injury. The screw length we utilized for LLMS was 21 ± 2.7 mm, longer than that of the LMS system (Roy-Camille: 14–15 mm, Mager l: 15–16 mm).[1-3] In this study, the 4.5 mm diameter screws were used for PS and 3.5 mm diameter screws for LLMS. The average insertion torque of PS was 105.9 cNm, while for LLMS, it was 64.9 cNm. The strength of LLMS screws was about 60% that of PS, suggesting that the insertion torque of LLMS tends to be higher despite the use of a smaller diameter screw. Here, using a 1 mm longer screw, the insertion torque increased by approximately 4.4 cNm.

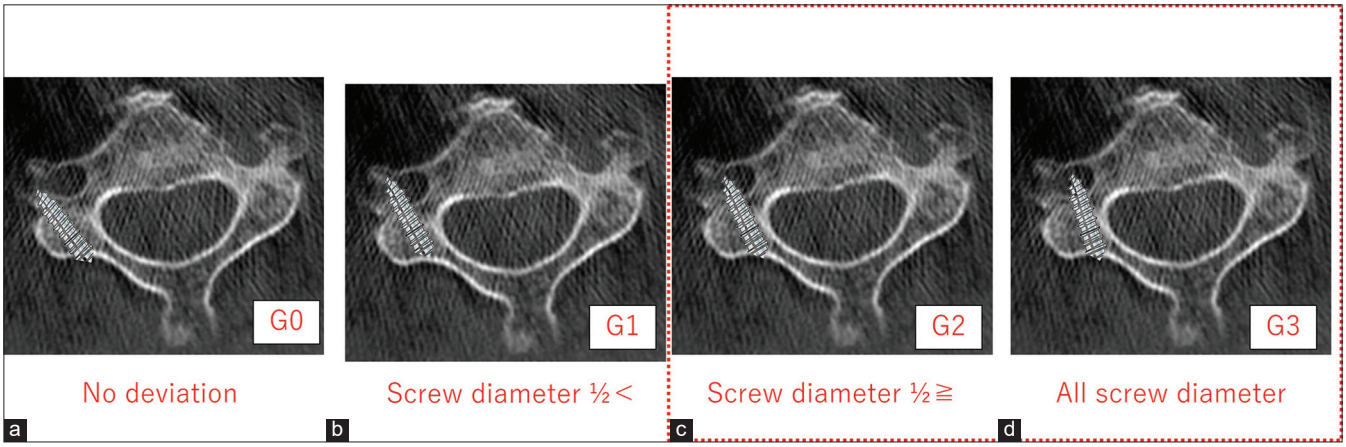

Figure 5: (a) G0: No deviation, (b) G1 Screw diameter ½<, (c) G2 Screw diameter ½ , and (d) G3 all screw diameter.

CONCLUSION

We concluded that the insertion torque of LLMS was higher than that of LMS and that LLMS provides stronger posterior cervical fixation.

Ethical approval

The research/study approved by the Institutional Review Board at Kawasaki medical school, number 3782, dated 2019/12/19.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that they have used artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript or image creations.

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