



Summary

Background: Surfing was added as an official event of the Tokyo Olympics in 2020. There are many surfers troubled by low back pain, but there is no scientific analysis until now. This time, we took MRI on the lumbar vertebrae in 20 official professional surfers and examined the relationship between the low back pain and the rate of the lumbar disc degeneration.

Materials and methods: Subjects are 20 people (16 men, 4 women) of 17 Japan official professional surfers and 3 Japan official professionals bodyboarders in total, average age 29.8 years old (17–57 years), we investigated by use of the lumbar vertebrae T2-weighted magnetic resonance imaging.

Results: 11 people (55%) had the low back pain, 10 people (50%) had the lumbar disc degeneration (more than Grade III of Pfirrmann classification), 2 people (10%) had the lumbar spondylolysis. There is no relationship between the low back pain and the rate of the disc degeneration.

Conclusions: The prevalence rate of low back pain in the professional surfers was approximately equal to previous report. The prevalence rate of the lumbar disc degeneration was 50%, and it was not high rate particularly in comparison with baseball and the swimming. The surfing competition is easy to cause the low back pain, but is not easy to cause the disc degeneration.

Keywords

Surfing – Professional surfer – Low back pain – MRI – Lumbar disc degeneration

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Lumbale Bandscheibendegeneration bei professionellen Surfern

Zusammenfassung

Hintergrund: Surfen (Wellenreiten) wird als offizielle Disziplin in das Programm der olympischen Spiele 2020 in Tokio aufgenommen. Obwohl es

ORIGINAL PAPER / SPECIAL ISSUE

Lumbar intervertebral disc degeneration in professional surfers

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Background

Surfing is recently attracting a lot of attention as one of the Olympic games at Tokyo 2020. However, there have been very few published reports which concerns sports-related acute injuries and chronic disorders sustained during-surfing. Moreover, many studies of injury on surfing were conducted on recreational (amateur) surfers. Those studies tend to include many minor injuries such as skin laceration and contusions, which would be resulted from surfer's insufficient skills. Thus, we believe that those studies do not precisely reflect the specificity of athletic surfing in terms of epidemiology. The purpose of this study is to clarify the relationship between the low back pain and the rate of the lumbar disc degeneration.

Materials and methods

Between 2015 and 2016, Subjects are 20 people (16 men, 4 women) of 17 Japan official professional surfers and 3 Japan official professionals bodyboarders in total, average age is 29.8 years old (17–

57 years). Average surfing career duration is 16.5 year (7–40 years). Average height is 166.6 cm (152.2–179.9 cm), body weight is 59.7 kg (40.0–76.6 kg) and Body mass index is 21.4 kg/m² (17.3–26.6 kg/m²). We investigated by use of the lumbar vertebrae magnetic resonance imaging (MRI).

Assessment of disc degeneration

We examined T2-weighted, density-weighted, fast spin-echo sagittal MRI scans (repetition time, 5000 ms; echo time, 107 ms) of the participant's lumbar spine using a 1.5 T imager (Excelart Vantage, Toshiba, Tokyo, Japan). Vertebral discs from L1/2 to L5/S1 in the mid-sagittal images were assessed. The degree of degeneration was classified into 5 grades according to Pfirrmann's classification (Fig. 1), with grade III or more considered degenerated. The images were assessed by one radiologist and one orthopaedic surgeon.

Low back pain

We asked about experiences of low back pain during their lifetime and during surfing (yes or no).

bekannt ist, dass viele Surfer unter Rückenproblemen leiden, fehlt eine wissenschaftliche Analyse der Situation. In der vorliegenden Studie wurde bei 20 professionellen Surfern eine MRT der Lendenwirbelsäule durchgeführt und der Zusammenhang zwischen dem tiefsitzenden Rückenschmerz und der Ausprägung der Degeneration der lumbalen Bandscheiben untersucht.

Material und Methoden: Eingeschlossen in die Studie sind 20 Profi Surfer (16 Männer, 4 Frauen) mit einem Durchschnittsalter von 29.8 Jahren (17–57 Jahre). Ausgewertet wurden die T2 gewichteten MRT-Aufnahmen der Lendenwirbelsäule.

Ergebnisse: 11 Surfer (55%) wiesen lumbale Rückenbeschwerden auf, 10 Surfer (50%) präsentierten eine Bandscheibendegeneration (höhergradig als Grad III der Pfirrmann Klassifikation). 2 Surfer (10%) zeigten eine lumbale Spondylolyse. Ein Zusammenhang zwischen dem lumbalen Rückenschmerz und dem Degenerationszustand der Bandscheiben zeigte sich nicht.

Zusammenfassung: Die Prävalenz des lumbalen Rückenschmerzes bei professionellen Surfern entsprach den Ergebnissen früherer Studien. Die Prävalenz der lumbalen Bandscheibendegeneration betrug 50%, was keinen hohen Wert im Vergleich mit Baseball und Schwimmen darstellt. Professionelles Surfen ist häufig mit lumbalen Rückenschmerzen verbunden, aber nicht mit dem Degenerationgrad der Bandscheiben.

Schlüsselwörter

Surfen – Profi Surfer – Lumbaler Rückenschmerz – MRT – Lumbale Bandscheibendegeneration

Results

11 people (55%) had the low back pain (surfers feel only a slight back pain after surfing, and there were no surfers who feel pain in their daily lives.). 10 people (50%) had the lumbar disc degeneration (more than

Grade III), 2 people (10%) had the lumbar spondylolysis. There is no relationship between the low back pain and the rate of the disc degeneration (Pearson’s chi-square test $P = 0.61$) (Table 1). But the mean age of surfers with disc degeneration is 31.5 years

Table 1. Disc degeneration and low back pain.

	LBP(+)*	LBP(-)	total
DD(+)**	6	4	10
DD(-)	5	5	10
total	11	9	20

* LBP: Low Back Pain.

** DD: Disc Degeneration.

Table 2. Level of disc degeneration.

Pfirrmann’s Grade	L4/5	L5/S1
III	3	2
IV	4	3
V	0	2

Table 3. Comparison of incidence of lumbar disc degeneration between surfing and other competitions.

sports	years	incidence	n
surfing	29.8	50.0%	20
baseball ^[3]	19.8	59.7%	57
swimming ^[3]	19.5	57.7%	47
Basketball ^[3]	19.7	42.9%	63
Non athletes ^[3]	19.5	31.4%	71

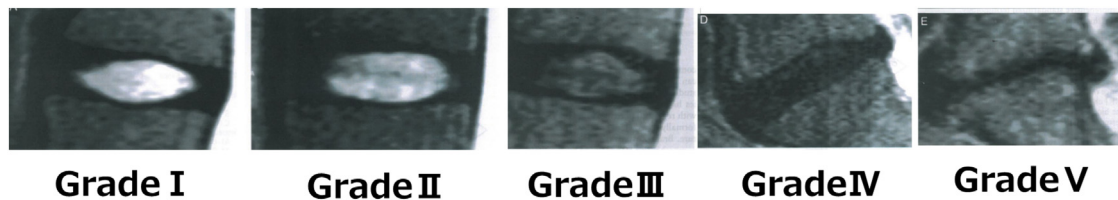


Figure 1
Pfirrmann's classification.

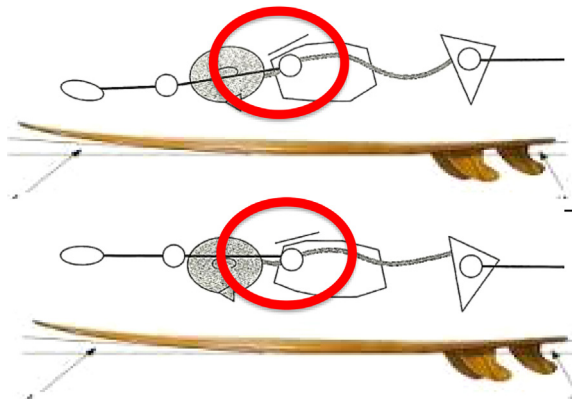


Figure 2
Disc degeneration cause only low level in surfer.

Table 4. Comparison disc degeneration level in surfing and other competitions.

	Surfing	Baseball [3]	Swimming ^[3]	Basketball [3]	Non athlete [3]
L1/2	0	8.8	6.4	4.8	7.1
L2/3	0	5.3	4.3	9.5	0
L3/4	0	5.2	10.6	3.2	1.4
L4/5	35	22.8	25.5	20.6	12.7
L5/S1	35	35.1	29.8	22.2	19.7

(%)

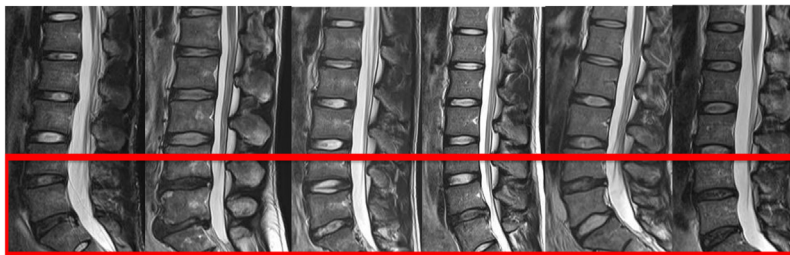


Figure 3
The shoulder joint contracture increases lumbar lordosis, which becomes a risk of low back pain.

and average age of surfers without disc degeneration was 27.6 years, with a significant difference the age of disc degenerating surfers was high (T -test $P = 0.0003$).

7 degeneration cases were observed at L4/5 level, with 3 cases of Grade III and 4 cases of grade IV, and another 7 cases were observed at L5/S1 level, with 2 cases of Grade III and 3 cases of grade IV and 2 cases of grade V. Disc degeneration was observed only at L4/5 and L5/S1 levels, in professional surfers (Table 2) (Fig. 2).

Discussion

Mattew [3] investigated the time spent in each surfing activity and reported, that only 8% of total time was spent for riding, and almost half of the time is spent for paddling. Paddling involves lumbar extension and rotation, so we think long hours paddling causes disc degeneration. To date, the relationship between low back pain and lumbar MRI degeneration has not been reported. Low back pain and disc degeneration associated with swimming motion, which is very similar to paddling, has been reported. The shoulder joint contracture increases lumbar lordosis, which becomes a risk of low back pain (Fig. 2) [2]. We think a similar mechanism could occur in paddling in surfing. Either lumbar extension or rotation increases disc stress. Particularly, nucleus pulposus is strongly compressed in rotation,

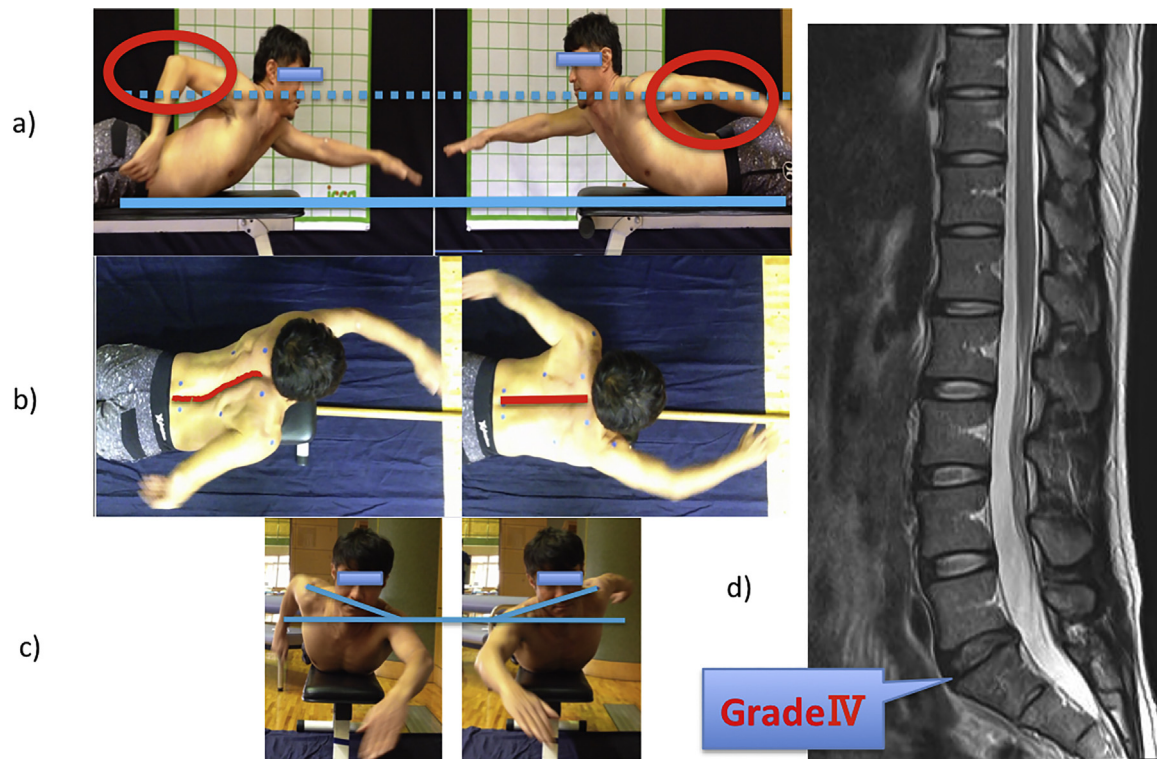


Figure 4

(a) Adjust left and right difference in movement of shoulder joint/elbow joint. (b, c) Compensation movement due to lumbar left bending and right swinging during right hand paddling. (d) MRI image shows Grade IV disc degeneration at L5/S1.

which could become a force to break the annulus fibrosus.

The risk of disc degeneration in surfing is not very high. It seems that it depends on the age rather than the influence of surfing. The incidence in surfing is not particularly higher than that in other sports (Table 3) [1]. If the average age of our cases was younger, the incidence would be further reduced, and we hope the incidence rate will decline to the level in non-athletes. Comparing the levels of disc degeneration, surfing showed lower incidence of degeneration in the upper lumbar disc than other sports (Fig. 3, Table 4) [1]. So in surfing, burden on the upper lumbar disc may not be high (Fig. 4).

Conclusions

The prevalence rate of low back pain in the professional surfers was approximately equal to previous report. The prevalence rate of the lumbar disc degeneration was 50%, and it was not high rate particularly in comparison with baseball and the swimming. The surfing competition is easy to cause the low back pain, but is not easy to cause the disc degeneration.

Conflicts of interest

The authors declared that they have no conflicts of interest in the authorship and publication of this contribution.

References

- [1] M. Hangai, et al., Lumbar intervertebral disk degeneration in athletes, *Am. J. Sports Med.* 37 (2009) 149–155.
- [2] K. Kaneoka, et al., Lumbar intervertebral disc degeneration in elite competitive swimmers. A case-control study, *Am. J. Sports Med.* 35 (2007) 1341–1345.
- [3] J. Mattew, et al., The effect of wave conditions and surfer ability on performance and the physiological response of recreational surfers, *J. Strength Condit. Res.* 28 (10) (2014) 2946–2953.

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