A new predictive index for back muscle degeneration and sagittal alignment associated with aging

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Introduction

Maintaining both lumbar lordosis and paraspinal muscle function is important in the prevention of low back pain.

Age-related sarcopenia is now a common problem in aging societies.
Although measurement of lumbar paraspinal muscle morphology using magnetic resonance imaging (MRI) is complicated, it effectively reflects the atrophy and fat infiltration of muscles. Therefore, our study focused on the groove between the left and right lumbar paraspinal muscles to obtain a simple index for evaluating back muscle degeneration. To quantify the depth of the groove between the paraspinal muscles, we used our own image indicator, the T-back value, that indicates the length of the bulge of muscle to the attachment of the spinous process. The purpose of our previous study was to evaluate the validity of this new index in determining paraspinal muscle degeneration.
Subjects
160 patients, aged 10–80 in decades (80 men / 80 women)
Lumbar lordosis $\geqslant 20^\circ$ (L1–S1)

- Cross-sectional area of the paraspinal muscles (CSA)
- Fat infiltration of the paraspinal muscles
- T-back value

We have already reported that the cross-sectional area (CSA) of the paraspinal muscle tends to decrease with age. Our new index, referred to as the T-back value, strongly correlated with CSA.
The aim of this study is •

- to determine the rate of occurrence of T-back values $\leq 0$.

- to evaluate the imaging features in patients with these T-back values.
Subjects

704 patients, who underwent an MRI of the lumbar spine at our hospital during 2010

333 men, 371 women

Age: mean 60.5 years (13 – 93)

Exclusion criteria:

History of lumbar surgery
Methods

- Body mass index (BMI)
- Lumbar lordosis (L1–S1)
  1. Cross-sectional area of the paraspinal muscles
  2. Fat infiltration of the paraspinal muscles
  3. T-back value

Axial T2-weighted MRI 1.5 Tesla
(at the intervertebral disc level from L1–L5)
• The rate of occurrence of T-back values $\leq 0$ is estimated.
• Imaging features in patients with T-back values $\leq 0$ is evaluated.
Results

The occurrence rate of T-back values $\leq 0$:

$$\frac{125}{704} \text{ patients (17.8\%)}$$

45 men (13.5\%) $<$ 80 women (21.6\%)

* $p<0.01$  Fisher’s exact test

Age:

68.0 years (20–88)

BMI:

21.9 kg/m$^2$ (13.0–32.9)

Lumbar lordosis:

19.5° (−3–49)
The occurrence of T-back values ≤0 increased markedly in individuals aged ≥60 years.

* p=0.02  Fisher’s exact test
T-back value $\leq 0$ : 17.8% of patients

- Higher in women
- Increased in patients aged $\geq 60$ years
- Less lumbar lordosis
- Tendency of decreased CSA
- High fat infiltration tendency in elderly patients
- Decreased CSA and increased fat infiltration tendency in women
- No correlation with BMI

Patients with T-back value $\leq 0$ included a number of elderly patients with degenerative changes such as disc narrowing, vertebral fractures, and focal kyphosis.
Patients with T−back value ≤0 included a few young patients exhibiting decreased lumbar lordosis without apparent degenerative changes.

Therefore, T−back value could be useful in the early detection in the patients at a high risk of low back pain.

Authors Disclosure Information
None of the authors has any potential conflict of interest.