Can I protect the wrestlers‘ spine from long-term damage?

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The wrestlers' spine

PRESENTATION OUTLINE

- Introduction
- Biomechanics of the spine
- Mechanical stress of the spine in wrestling
- Can I prevent late damage?
The wrestlers’ spine

Introduction

United World Wrestling (UWW) Scientific Commission
Director: International Network of Wrestling Researchers (INWR)
Editor: International Journal of Wrestling Science
The wrestlers‘ spine

Dr. David Curby: E-Mail 2018 February

I am involved in a project to improve the neck and back health of wrestlers...........

It began with a question from a parent asking:

“Is the wrestler’s bridge a safe exercise?”

A very simple question about an exercise that has been firmly entrenched in the training of wrestlers for centuries, but upon closer investigation, there is not very much information available to provide a definitive answer

Hence, this letter requesting your observations and recommendations for the creation and implementation of an age-appropriate program of neck and back strength and flexibility development that is based on science and medicine

Our intent is not to “ban” bridging exercises. The bridge and back arch though they can be seen as “extreme” are fundamental positions employed in wrestling for both offense and defense ..................
The wrestlers‘ spine

Introduction

Dr. med. Eckart D. Diezemann

Here is my opinion on this problem
The wrestlers‘ spine

Introduction

Orthopaedic-traumatological sports medicine is not only based on the knowledge of the shape and function of the musculoskeletal system, but must also deal with the mechanical stresses to the musculoskeletal system caused by the sporting activities.

Reference: Brüggemann, G.-P.: Biomechanik. In: Klümper A., Sporttraumatologie, ecomed, Landsberg/Lech (04/01, III-2) 1-60
The wrestlers' spine

PRESENTATION OUTLINE

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▪ Biomechanics of the spine

▪ Mechanical stress of the spine in wrestling

▪ Can I prevent late damage?
Biomechanics is an interdisciplinary science that describes, investigates and evaluates the movements generated by the musculoskeletal system. It deals with interactions between movements generated by the musculoskeletal system and the resulting biological reactions in sporting activities.

Reference: Brüggemann, G.-P.: Biomechanik. In: Klümper A., Sporttraumatologie, ecomed, Landsberg/Lech (04/01, III-2)1-60
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Biomechanics of the spine

Performance of the biological structures of the spine

The maximum forces causing fracture of a vertebral body clearly increase from the cervical spine to the lumbar spine

Reference: Brüggemann, G.-P.: Biomechanik. In: Klümper A., Sporttraumatologie, ecomed, Landsberg/Lech (04/01, III-2)1-60
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Biomechanics of the spine

Performance of the biological structures of the spine

The spine prefers to have the stress pressure exactly in the middle of the intervertebral discs.

The vertebral body takes over the main load.

The lowest resistance is found at the lateral edges of the posterior areas.

The vertebral joint only takes over approx. 10%.

References: Brüggemann, G.-P.: Biomechanik. In: Klümper A., Sporttraumatologie, ecomed, Landsberg/Lech (04/01, III-2)1-60
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Biomechanics of the spine

Performance of the biological structures of the spine

Hyperextensions combined with rotational loads may lead to premature degenerative changes in the spine

Reference:

Reference: Laschinger: Bronze Wrestling group 3rd century BC
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Biomechanics of the spine

Performance of the biological structures of the spine

The skeleton is held by the muscles. Wrestlers must be able to tolerate enormous opponent forces. To prevent injuries, they need a powerful supporting and protective muscle corset.

References: Hartmann J., Tünemann H.: Das große Buch der Kraft, Sportverlag Berlin (1990) 243

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Biomechanics of the spine

Recommendations for everyday life: Right or wrong

Reference: Berufsgenossenschaften, Germany
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Mechanical stress of the spine in wrestling

Performance of the biological structures of the spine

“Knowledge of mechanical laws and detailed information on the physical activities and mechanical movements occurring in wrestling and the loads on biological structures are a necessary requirement in order to avoid possible over-stress and to identify and understand damage”

Reference: Brüggemann, G.-P.: Biomechanik. In: Klümper A., Sporttraumatologie, ecomed, Landsberg/Lech (04/01, III-2)1-60

Foto: J. Richter
The wrestlers‘ spine

Mechanical stress of the spine in wrestling

Performance of the biological structures of the spine

Reclination

Nucleus pulposus

Intervertebral disk

Source: simplebackpain.com

Foto: J. Richter
The wrestlers' spine

Mechanical stress of the spine in wrestling

Performance of the biological structures of the spine

Flection

Foramen intervertebrale

Nucleus pulposus

Source: simplebackpain.com

Foto: J. Richter
The wrestlers' spine

Mechanical stress of the spine in wrestling

Performance of the biological structures of the spine

Reclination

Rotation

Nucleus pulposus

Intervertebral disk

Source: usa wrestling
The wrestlers' spine

Mechanical stress of the spine in wrestling

Performance of the biological structures of the spine
The wrestlers' spine

Mechanical stress of the spine in wrestling

Recorded: FILA Video-Team
The wrestlers' spine

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Can I prevent late damage?

What late damage do we observe on the spine?
The wrestlers’ spine

Can I prevent late damage?

Neck Hals

Spondylarthrosis
Spondylosis
Osteochondrose

Nape Nacken

C2 C3 C4 C5 C6 C7
The wrestlers' spine

Can I prevent late damage?
The wrestlers’ spine

Can I prevent late damage?

The next question we need to answer is:

Do former wrestlers really have degenerative changes in the spine more often than the normal population?
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Can I prevent late damage?

References:


Summery:
“In male wrestlers, radiologically degenerative changes were found more frequently compared to a control group particularly in the area of breast and lumbar spine"
The goal of our sports medicine activities should be to accompany the athletes through their sporting careers, keeping injuries and the risk of late damage as low as possible.
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Can I prevent late damage?

The next question we need to answer is:

What options are there to prevent late damage in wrestling?
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Can I prevent late damage?

Parameters for late damage in competitive sports are:

**Endogenous factors:**
- Family disposition
- Coordinative skills, talent
- Height, body weight (overweight)
- Malpositions of extremities and of the spine
- Diseases (e.g. spine: Scoliosis, Scheuermann’s disease)

**Exogenous factors:**
- Injuries
- Sport-specific stress
- Intensity and duration of the sporting activity
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Can I prevent late damage?

Wrestling-specifics parameters for late damage are:

Exogenous factors:

➢ Injuries

➢ Sport-specific stress on the spine (Hyperextensions combined with rotational loads)

➢ Intensity of the sporting load (Double load: Own body weight plus opponent's body weight, explosiveness)

➢ Duration of the sporting load (Start of the wrestling career at about 6 years end often at over 30 years)

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Duration of the sporting load in wrestling

A German idiom says: “Constant dripping wears the stone”

Do the constant unfavourable loads in wrestling “hollow out” the spine over 30 years too?
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Can I prevent late damage?

The next question we need to answer is:

On which parameters do we as sport-physicians really have influence?
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Can I prevent late damage?

What parameters can we influence?

Endogenous factors:

Sports medical examination and subsequent meeting with parents and responsible trainers

Exogenous factors:

- Injuries (?)
- Sport-specific stress
  - Competition (no!)
  - Training (?)
- Intensity and duration of the sporting load (no!)
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Can I prevent late damage?

What parameters can we influence?

Training (?)

Slow adaptation of youngsters to wrestler-specific loads

Source: 2019 usa wrestling
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Can I prevent late damage?

What parameters can we influence?

Training (?)

A trainer entrusted with youngsters also need basic knowledge of the shape and function of the musculoskeletal system. He should consider the mechanical stresses of the musculoskeletal system caused by sporting activities and their possible consequences.

Reference: Brüggemann, G.-P.: Biomechanik. In: Klümper A., Sporttraumatologie, ecomed, Landsberg/Lech (04/01, III-2) 1-60
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Can I prevent late damage?

Examples of static abnormal stress in training

Source: Dave Curby 2019
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Can I prevent late damage?

Examples of extreme stress in warm-up and preparation
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Can I prevent late damage?

What parameters could we influence?

Training (?)

We should ask ourselves:

Are these exercises still up-to-date? We should consider alternatives. What has been good for decades does not always have to be so.

Reduction of spine loads in training by alternative strength & flexibility training on suitable equipment is necessary to develop strength of the musculature. Only so can abnormal loads of the spine in wrestling be reduced in light of the fact that this sport is practiced for decades.
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Can I prevent late damage?

What parameters could we influence?

Training (?)

I found these pictures in: “Das große Buch der Kraft" from the former GDR (1990). Have the authors thought yet about alternative methods for strengthening the muscles?

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Can I prevent late damage?

What parameters could we influence?

Alternative strength training (?)

4-way neck - front

4-way-neck – rear

4-way neck - side

Reference:
Kieser Werner,
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Dr. David Curby: E-Mail 2018 February

It began with a question from a parent asking:

“Is the wrestler’s bridge a safe exercise?”

What was my answer?

I told him – as I have told you - about my observations and recommendations on this question as a sport physician in wrestling after almost 35 years.
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THANK YOU FOR YOUR ATTENTION