
FEDERATION INTERNATIONALE DE GYMNASTIQUE



INFORMATION MÉDICALE

MEDICAL INFORMATION

PRATIQUE DE LA GYMNASTIQUE SPONDYLOLYSE

GYMNASTIC PRACTISE AND SPONDYLOLYSIS

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GYMNASTIC PRACTISE

and

SPONDYLOLYSIS - SPONDYLOLISTHESIS

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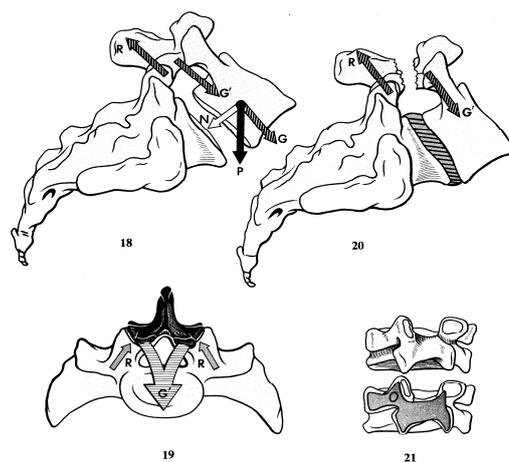
Spondylolysis is a lesion caused by an acute or stress fracture generally affecting the vertebral isthmus at L5 S1 or, less frequently, at L4 L5. The condition is exacerbated when the athlete falls or slips during activity with the back in a hyperextended hyperlordotic position, which aligns the pedicles impacting the isthmus.

A genetic or ethnic predisposition may also play a role, and in some cases the condition is due to a difficult childbirth.

The critical period of onset occurs between the age of five and seven years. Isthmus lysis may present unilaterally or bilaterally.

Spondylolisthesis is the anterior displacement of the vertebral column in relation to the vertebrae or sacrum below, made possible by spondylolysis or by the elongation of the interarticular segment of the posterior vertebral arch, otherwise known as the *isthmus*.

About 1/3 of all spondylolyses progress to spondylolisthesis, the majority of which remain a Grade 1 lesion (approx. 85% of cases). Studies show that the incidence of isthmic lyses is 4-8% in the general population, but as high as 16-22% in high-level gymnasts which is higher than in most other sports).



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I.A. KAPANDJI Physiologie articulaire -Librairie Maloine-



There are **three grades** of spondylolisthesis which **correspond** to varying degrees of dysplasia.

These dysplasias are located:

- at the 5th lumbar vertebra: atrophy of the articular apophyses, spina bifida, a thinned and elongated isthmus. The vertebral body may assume a trapezoid shape, with the anterior side shifting higher than the posterior.
- at the sacrum, dysplasia may develop on the sacral plateau, either domed or S shaped, and depending on the positioning of the sacrum, it may be vertically or horizontally oriented. It may have a hook or rectilinear shape.
- the intervertebral disc becomes flattened, losing its shock absorbing and stabilising capacities, which causes slipping and displacement of the disc.

Dysplasia Classification (Roy-Camille)

<u>GRADE I</u>	Minimal dysplasia at the L5 vertebral body, slightly trapezoidal at the posterior arch with spina bifida occulta.
<u>GRADE II</u>	More pronounced dysplasia. The L5 body is trapezoidal, the sacral dome is S shaped, the sacrum appears hooked. Dysplasia of the L5 posterior arch is more advanced than in grade I.
<u>GRADE III</u>	Major dysplasia causing a deformed vertebral body, a veritable trapeze, the isthmus is elongated and the vertebral plateau is domed (risk of slipping is extreme).

Four stages of development categorise spondylolisthesis based on the severity of the slip :

<u>Stage I</u>	Minimum slipping of less than 1/3 of the vertebral plateau, no dysplasia.
<u>Stage II</u>	Slipping of 1/3 to 2/3 of the trapezoidal dysplasia plateau, S shaped sacral dome dysplasia of the posterior arch.
<u>Stage III</u>	Slipping of more than 2/3 of the vertebral body plateau in trapeze; domed plateau.
<u>Stage IV</u>	Spondyloptosis



SYMPTOMS

Simple isthmus lysis is often asymptomatic, even when associated with a grade I listhesis.

Two relatively typical clinical cases:

- **Acute spondylolysis** in children; the child presents with a violent lumbago usually after a lumbar hyperextension. Pain may radiate to the posterior thigh; it is debilitating and worsens when the patient participates in sport. Clinical findings are usually inconclusive, with lumbar stiffness and paravertebral muscle spasm in the absence of neurological findings.
- **Spondylolisthesis in adolescent athletes**
The onset of low-intensity lumbar pain that increases with training; acute episodes of intense pain may occur over a period of a few weeks.
Progression is generally clinical (I don't understand this), aggravated by physiological fatigue and by a sitting or standing position.

DIAGNOSIS

Diagnosis is based essentially on medical imaging examinations.

Systematic medical screening in asymptomatic top level young athletes has many advantages, however excessive irradiation of the pelvis should be avoided; certain countries are strict on this issue, as is the medical academy (what is the medical academy?).

Common sense and wise decision making are of the utmost importance here.

Having stated this, lumbago in young athletes requires **X-rays** in frontal-profile-3/4 positions.

In cases of unilateral isthmian lysis, a **bone scintigraphy** may be performed to pinpoint localised hyperfixation and to determine whether the lysis is recent, allowing a physician to accurately prescribe a possible rehabilitative brace.

A bone scan may reveal lyses which have gone undetected by X-rays; it may uncover posterior articular lesions and confirm the existence of minimal spondylolisthesis with images revealing pseudo-protrusion of the disc.

An MRI is useful in determining the exact location of lesions in gymnasts with spondylolisthesis, particularly in cases of sciatica, disc lesions, foraminal stenosis or ductal stenosis.



TREATMENT

Acute spondylolysis in children

Rest is prescribed for children once an isthmic fracture has been identified. A correctly fitted cast or brace is applied.

The aim of treatment is to reduce inflammation rather than actually heal the condition; most cases result in pseudarthrosis.

The degree to which a patient experiences residual symptoms may determine the athlete's sporting career.

Spondylolisthises in adolescents practising high-level sport; lyses are often diagnosed retrospectively as pain episodes are considered commonplace in intensively active gymnasts. It is wise to propose a period of inactivity or to limit gymnastic exercises in both frequency and intensity. Proposed treatment for lumbosacral kyphosis includes immobilisation through the use of a brace to temporarily avoid excessive strain on the isthmus and to impede progression of the condition.

If pain persists during sporting activities, a number of surgical procedures may be considered depending on the type and severity of the slip.

MEDICAL SUPERVISION GYMNASTIC PRACTISE ACCESS

The main issue is whether or not the athlete can conduct gymnastic activities despite the presence of a spondylolysis or listhesis. Pain **tolerance translates into stability**. When pain is absent in cases of lysis, there is no correlation between discomfort and the severity of the slip.

When a disc is normal despite the grade of spondylolisthesis, clinical tolerance is usually rather good; as the disc degenerates, the spondylolisthesis usually becomes more advanced.



ABILITY TO PARTICIPATE IN GYMNASTICS

IMPORTANT CRITERIA

Pain, and in particular joint pain, is always a major sign of distress which **must not be ignored**. The absence of pain does not signify the absence of pathology, and the intensity of pain is not always in proportion with the severity of the lesion.

In the absence of pain, it is still important to make a diagnosis. This is not an easy task. It has been recommended that a minimum of radiological examinations be carried out routinely (Is this what you mean?). When pain is present, a medical and radiological examination should be obligatory.

Pain remains the most important clinical indication in diagnosing a condition. It is important to evaluate the level of exertion an athlete can tolerate and to allow correct training to continue but always keeping well under the athlete's pain threshold.

- **Gymnast Morphology**

Attention should be given to the gymnasts' morphology and, particularly, the presence of hyperlordosis.

- **Clinical history and examination**

These are both very important in evaluating disc and related pathologies.

- **Dysplasias**

In cases of dysplasia, grade plays an important part in deciding to what extent an athlete may engage in physical activity. Gymnasts with Grade III dysplasia must NOT train or participate in competition, this is an absolute contraindication, whereas grades I and II are open to individual interpretation.

- **Isthmus lysis with or without listhesis**

Severity staging (I – IV) of vertebral slip is important when discussing the level of an athlete's physical activity. Athletes with Stages III and IV should not participate in gymnastic activities. Stages I and II are open to interpretation.



TECHNICAL CONSIDERATIONS

- Giving professional advice on the acceptable intensity and frequency of gymnastic activity is of utmost importance. It provides an opportunity for subacute pain episodes to pass, and allows a gymnast to limit his training programme as well as the number of annual competitions in which he will participate. Good management will help a gymnast to select a reduced number of apparatus, which will ultimately ease stress on the lumbosacral joint.
- The quality and **technical mastery** of gymnastic elements play a significant role in the tolerance of articular (particularly spinal) pathologies
- Quality **gymnastic equipment** (floors, mats, etc.) is important in protecting affected joints.
- Appropriate **physical preparation** keeps the spinal column flexible, toned and well-positioned (cf. negative effects of hyperlordosis).
- **Technical regulations**, notably the points scoring systems, should take into consideration the risks involved for the spine in a given exercise, and should either ban or reduce the value of these potentially dangerous exercises accordingly.

This is where a **coach's involvement** is essential; his or her professional, technical, ethical and organisational capacities may guide a gymnast through a period of spinal pathology.

Those who establishing the **rules, create the** technical programmes, design the competition **formats**, are responsible for gymnastic equipment approval, design the age group **programmes**, etc., bear a heavy responsibility.

MEDICAL FOLLOW-UP

Just as appropriate technical support is imperative in an athlete's career, so too are high-quality and continuous medical follow-ups; they play an important role in evaluating athlete aptitude and help in gauging the athlete's level of fitness.



NOTES

The chart on page 8 helps one to evaluate different diagnostic criteria.

The chart combines objective elements and subjective assessments, never forgetting that **ethical considerations** are the basis of any decision.

A score is merely an aid in assessing aptitude. It in no way gives a definitive diagnostic or management tool.

A physician's final decision is based on his sense of professional and personal integrity. He knows that his decision may give rise to comments, remarks, and possibly strong opposition on the part of the gymnast, the gymnast's family and sporting environment.

A doctor must focus his attention on an athlete's health. He must not be swayed from his decision, and should seek council and feedback from the national Medical Commission and other colleagues. It is his job to explain his position to the patient, to offer support in a time of psychological strain, disappointment or discouragement, and to direct the gymnast toward other physical and sporting activities, if the need be.

SPONDYLOLYSIS - SPONDYLOLISTHESIS

SPORT _____	Discipline _____
Last Name _____	First Name _____
Date of Birth _____	

Dysplasias	Without +	GRADE 1 ⊖	GRADE 2 ⊖⊖⊖	GRADE 3 INAPT	
Slipping	Without +	Stage I ⊖	Stage II ⊖⊖⊖	Stage III INAPT	Stage IV INAPT
Disc pathology	Without +	Moderate ⊖	Significant INAPT		
Clinical Signs Pain	Without +	Pain ⊖	Significant pain ⊖⊖⊖		
Hyperlordosis Morphology	Without +	Hyperlordosis ⊖	Pronounced hyperlordosis ⊖⊖		
Growth pathologies or disorders	Without +	Moderate ⊖	Significant ⊖⊖		
Appropriate technical follow-up	+				
Appropriate medical follow- up	+				

Other decisive factors =

Scoring ➔ Sum of points + and ⊖

- Absolute contraindication: score < ⊖ 1
- Temporary consent to practise. Must be renewed and is subject to regular medical evaluation and appropriate gymnastic practise: score between ⊖ 1 to 3
- Consent with supervision: score > 3

Decision =



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Bibliography and works cited:

- Rachis et Sport – MASSON 1995.
(*c.f. PENNECOT / BENAZET – SAILLANT - CHAMBERLIN - ROLLAND - ROY-CAMILLE / M. LEGLISE*)

- *Dr Michel LÉGLISE:*
 - *text*
 - *Chart for the evaluation of aptitude in spondylolysis and spondylolisthesis*

Thanks to Dr David McDonagh, FIMS