Academy of PHYSICAL MEDICINE

# Broadcast Summary

# Spondylolisthesis and Sports-Related Back Pain

With Nick Birch – FRCS (Orth)

## About Nick Birch

- Consultant spinal surgeon since 1996 before specialising exclusively in spinal disorders in 2002.
- Regularly participates in lectures and teaching across Europe.
- A very keen supporter of conservative rehabilitation where possible having close links with experienced professionals of Physiotherapy, Osteopathy, Chiropractic and Pilates around the region.

## Spondylolisthesis

- Not congenital. The incidence at birth is zero.
- Attention to this developmental problem (i.e. spondylolysis) is given if it causes symptoms.

| 5 Basic types of spondylolisthesis | Description |
|---|---|
| 1. Developmental | ▪ Occurs early in life usually before the age of about 10 (before puberty). |
| 2. Lytic | ▪ Pars fractures<br>▪ Affects teenagers and adults<br>▪ Increasing frequency from about the age of 35-40 |
| 3. Degenerative | ▪ Very common<br>▪ In women over 50 years and men over 60, incidence is 1 in 10; (male to female ratio is 1:3) |
| 4. Traumatic | Not discussed |
| 5. Pathological | Not discussed |

**Statistics:**

- 4.4% of the Caucasian population will have pars fractures by the age of 6. Incidence is 1 in 20. (Not congenital, rather developmental); 6% of the general Caucasian population will have pars defects by the age of 15.

- 50% of Eskimos and Inuits will have pars defects

- Could go as high as 15% among elite athletes (rugby, cricket, gymnastics, etc.) get pars defects.

## Pars defect

| Types of pars defect | Recommended approach |
|---|---|
| **Unilateral pars defect**<br>• 70-80% chance of mending | 1. Rest the players. |
| | 2. Give the right treatment. |
| | 3. Get the defect mended up. |
| | 4. Get them back to sports (graded return). |
| | **Note:** Once the bone is healed, put pressure through it (strengthening/hardening process) to build it up, make it stronger so it doesn't go again under the same loading. |
| **Acute bilateral pars defect**<br>• 20% chance of healing | 1. Stop them (players) from doing what they're doing that is causing the problem which is repetitive extensions and flexion. |
| | **Note:** This is a more chronic condition with 1 in 5 chance of mending. The pars defect itself, once it has established (i.e. among late teens where they've finished their growth), hardly causes pain. The cause of pain may come from something else – perhaps from the disc or muscles. |

## On how bilateral pars defect presents itself

- Pain across the lower back (can be unilateral but usually it is bilateral). Might go into the buttocks.
- Rarely present with any leg pain or any neurological symptoms.

## In practice

- Clinicians should be very wary when they see a child who is in the growth period (around puberty/ ages 11-13) and with history of pars defect. If the child has gone past growth period (ages 15-17), administer treatment symptomatically.

## Case 1

A year ago, an 11-year old four foot nine runner presented with heel pain (with tingling/pins and needles) on the right. The diagnosis was Sever's disease (osteochondritis of the growth plate, of the apophysis). She got the same pain on the left side and could no longer bear weight. She had been on crutches for many months. She hadn't been able to run and the clinician realised that there might be something else going on. X-ray and MRI showed that she has got a significant spina bifida occulta (a combination of a congenital and acquired problem). Surgery was needed. As she hadn't hit her growth spurt yet, a paediatric spinal surgeon had to manage the problem and set expectations with parents and coach.

***Prognosis***: The girl has a two level fusion that will completely immobilize joints L4-5, 5-S1. She has a poor chance of a high level career in sports and is unlikely to achieve her previous potential.

***Surgical method:*** Keyhole surgery - making little stab incisions in the back of the spine and putting screws down into the vertebrae through the pedicles, and linking them together with rods.

***Process of graded return to some form of exercise***:

- Mend first. The bone has to heal and this is going to take about 16-20 weeks.
- If the fusion goes well (no complications), start the patient with a bit of cycling, swimming and other non-weightbearing activity (cardio-vascular stuff). In regard to swimming, advise against doing old ladies' breast stroke or butterfly because these demand a lot of extension in the spine.
- Engage the patient in a walking program from day one – between 300-400 metres twice a day. Do this for a week. Gradually increase to 600 metres twice a day—and gradually increase until the patient can do two and a half kilometres twice a day. This takes about six weeks.
- Start formal physiotherapy program, reeducate all the muscles. Get the patient through hydro for six or eight weeks.
- Begin with a little bit of gym work, a bit of cycling, and a bit more swimming in the open pool. Then by six months (when everything's healed up), the patient can start to do some impact work.

- Consider a home school program for young patients to prevent delay in healing, as children are often tempted to do physical activities - the result of which in the long term might not be good.

- An MRI or bone scan allows early detection / diagnosis of stress reaction (bone oedema) and can be useful in reducing the amount of time that patients are off their sport.

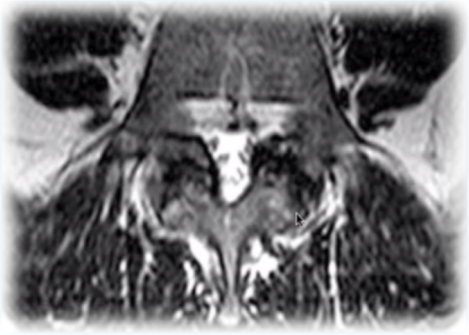
- L5 pars is where almost 90% of these pars defects occur.

## On how pars defects are acquired

- Anything that produces repetitive bending and flexion of the spine, strain on the back, can produce pars defects. In England, cricket is the commonest cause in boys, gymnastics in girls.

- 15% of athletes acquire pars defects. Ballet dancers and runners are susceptible to this too. 35% of professional sportspeople at any one time will have some sort of stress reaction on either MRI or a bone scan.

- There is very little or no incidence of acquiring pars defects among horse riders. They don't normally go into repetitive flexion extension.



**Scan image of Elephant's foot:** Big swollen elephant's foot appearance due to the exuberant amount of callous around a nonunion fracture that's been trying to heal.

Competitive divers can get it only when they dive badly (diving is all flexion, not flexion and extension).

- Elite rowers get a combination of disc degeneration, particularly in teens. They also get lysis. Lysis rate is slightly higher than the background rate (not as high as cricketers, gymnasts or others doing repetitive sports).

## On people with L5 S1 problem

- A comparative study involving two groups of people with L5 S1 problem (i.e. First group had anterior fusion surgery performed on them; Second group was without surgery), showed that there was a 12% rate of adjacent level degeneration in both groups at the end of the 20-year study. Rebalancing the spine in the correct sagittal profiles does not predispose to adjacent degeneration.

- Another study indicated that 75 to 80% of the variation in disc generation is heritable. Majority of the reason why people have disc degeneration is inherited. It is only when an individual is genetically predisposed to degeneration that the rate of incidence of adjacent level degeneration is higher.

## On chronic defects

- This is unlikely to heal. Clinicians just need to control the pain and then get the patients back to their sport as pain allows. Past fractures (as long as they finish growth) has no more relevance. Fractures that have not finished growth are the ones that can progress.

## On training programs for youngsters in rehab

- Cycling (during summer) and turbo trainer (during winter): These are flexion activities.
- Water walking: Do this with a flotation vest. Let them run up and down the pool a number of times because gravity's been taken away and they don't have that repetitive flexion extension.
- Pilates: Do this as maintenance program. Engage their core.

## On minimizing the incidence of spondylolisthesis

- Educate the whole population that they have to do core exercises daily. (Reality is that there is no way that a medical intervention can be instituted to reduce the incidence of spondylolisthesis to occur).

## On writing a form for the radiologist

- Give enough context (e.g. 15-years old, elite athlete, fast bowler, query spondylolysis). This will guide radiologists on what to look for. The more information, the more likely they could pick up or not miss the problem.

## On MRI vs. CT scan

- The MRI is a non-ionising radiation investigation tool, but does not show the pars defects as well as the CT scan. The latter is a practical tool to examine bone but not soft tissue. If a clinician suspects a pars fracture, do a CT scan. The MRI on the other hand has the highest pick up for whether there is a developing pars /or some stress reaction.

- In terms of image quality, upright MRI is not as good as the conventional horizontal scan because the former has only 0.6 tesla magnet (sometimes as low as 0.3 tesla) while the latter has 1.5 tesla magnet in a round configuration--which means one can get a coherent magnetic field across the body (which you can't get in upright magnets coming across the side).
    - ***For patients who want to get a copy of the MRI image***: They can pay for the images to be burnt onto a CD which can then be put into OsiriX, with a fee between 10-35 pounds.

    - The benefit of the upright magnet is that one can do functional imaging with it (sit, stand, flex, etc.). The downside is that the acquisition times are much longer (about twice as long) and they are more expensive.

## On MRI report generated from a GP's referral

- GPs have access to the MRI and yet they do not have the ability to interpret it and make sense of the report. The problem with their report is that it could say nothing that the patient has no structural problem but rather has a functional problem i.e. muscle problem or a degenerate spine.

- Clinicians should recommend a specific procedure to GPs (Eg. MRI to look for edema evidence of damage), since they are not equipped with a level of specialist knowledge in this area.

- The national low back pain and radicular pain pathway run by specialists through NHS England, introduced a move to stop primary care access to MRI scan. The intention is to not put the GPs in the invidious position of being faced with reports by anonymous radiologists who they do not interact with, and who has never seen the patient. The key here (among clinicians) is to cross-correlate the MRI with the report.

- **About pathway:** This is run by specialists (i.e. physios, osteos, chiropractors, nurses who are trained in interpretation of MRI scans), where patients can have access to treatment investigation by people who really understand the context of their physical problem.

## On palpating

- Clinicians cannot palpate a pars defect. But if they press where the facets are and they squeal, then acute pars defect is present, particularly in thin athletes. If the latter have developed a grade one spondy that is active - the palpation of the spinous process will hurt them.

## On surgery

- Spinal operation should not be done if a patient does not need it. Explore all other conservative measures. An operation can be performed only when the patient did not get better after six to eight months of therapy (by physiotherapy, by osteopathy, chiropractor, traction, acupuncture, etc.).

- Surgery is needed once the pain doesn't go away as in the case of having sciatic nerve damage. Having pain but no motor loss is completely fine. (***Note:*** Neurological pain with or without neurological damage is suspected if the patient's pain increases or there are neurological symptoms.)

- All surgery is by definition destructive, not reconstructive as surgeons say. (For example, a patient gets proprioceptive loss after a replacement surgery).

## On using inversion tables

- A few minutes on a traction/inversion table can be very helpful since spondylolisthesis is a gravitationally induced problem. Remove gravity and the symptoms improve. The process does not mend the problem, but manages the symptoms effectively.

## On extension braces

- No evidence that extension braces have any beneficial effect in the acute management of pars defects.
- Not a therapeutic tool, but useful 'aide memoire' that they've got a problem).

## On coaches of elite athletes

- Many do not know about spondylolysis or spondylolisthesis. They don't recognize that 15% of their charges could get it.

- Want perfection from their athletes all the time. They don't want an injured player – not necessarily interested in the latter's rehabilitation.

- They need to be involved in the rehabilitation process (the latter being a process of education). ***The buy-in is the key with coaches*****.**
    - **Example:** A promising 16-year old tennis player developed bilateral pars defects. The coach was asserting that "everybody else under his charge who's got pars defect got better after six weeks – why can't she resume playing tennis?" The treatment took nine months.
    - ***Outcome***: Can play completely normal now. A bit behind where she could have been but physically able to maximize her great potential

## Other matters

### On the Society of Back Pain Research

- Oldest of the spine societies in the UK
- Comprised of a small number of surgeons, researchers, physiotherapists, osteopaths
- 2017 meeting on 2-3 November in Northampton (open to all)
- Dinner at Park Inn Hotel, North Hampton
- Will be hosted by Nick Birch

### On OsiriX lite

- The MD version costs $700 – one year license
- FDA compliant
- Capable of telling the investigation type (i.e. CT, MRI, X-ray, SPECT, PET, etc.)
- Capable of giving dimensions (i.e. size of tumor); 3D rendering
- Can read MRI data burnt onto CD
- Present version has a little glitch