From the clinic

Bilateral rupture of the quadriceps tendon associated with anabolic steroids

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Resisted knee extension may rupture the extensor mechanism, the precise site varying with age. In the elderly, the injury is often suprapatellar; in middle life, the patella fractures; in young adults, the patella ligament ruptures. In adolescents, the lesion often lies in the upper tibial apophysis.

Simultaneous bilateral quadriceps rupture is rare and only 31 cases have been reported previously. Predisposing factors are often present¹.

We report a case where anabolic steroid abuse is identified as a predisposing cause.

Case report

A 29-year-old competitive body builder presented to us following a jump from a height of 15 feet, landing on both feet with flexed knees. He complained of pain and swelling in both knees and was unable to stand.

On examination, he was unable to straight leg raise and a gap was palpable above the superior poles of both patellae. X-rays showed discontinuity of both quadriceps soft tissue shadow (Figures 1a and 1b), irregular calcification within the tendons and forward tilting of both patellae. Bilateral rupture of the quadriceps tendon was confirmed by ultrasonography (Figure 2).

After persistent questioning, the patient admitted to ingestion of anabolic steroids prior to competition 11 months previously. The substances he took were a combination of stanozolol, nandrolone decanoate, methandrostenolone and clenbuterol. He denied any steroid ingestion in the past 11 months but has been actively body building. Interestingly, he has been experiencing pain in the quadriceps tendon prior to this injury.

Figure 1a and b. X-rays showing the calcification of the quadriceps tendons and forward tilt of the patellae.

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Operative repair was undertaken (Figure 3). The ruptures were found at the osseotendinous junction of the quadriceps tendon with extensions into the medial and lateral retinacula. The tendons were repaired with strong sutures passed through drill-holes in the patellae. Both legs were immobilized in plaster cylinders for a period of 8 weeks.

Four months after the operation, the patient is able to straight leg raise with minimal lag and could flex up to 60°.

Figure 2. Ultrasound scans demonstrating the gaps in the quadriceps tendons

Figure 3. Operative findings

Figure 4. The patient

Discussion

Simultaneous bilateral ruptures of the quadriceps tendons are rare and associated with some predisposing generalized conditions. Chronic renal failure, gout and hyperparathyroidism are implicated in younger patients, with diabetes and obesity in the older¹. These conditions were excluded in our patient and it is reasonable to attribute the injury to his steroid ingestion.

The effect of anabolic steroids in the induction of tendon pathology in combination with exercise is well supported in animal experiments. Dose-related ultrastructural abnormalities of collagen fibrils in mice tendons were observed by Michna². This occurred to the greatest degree in steroid-treated mice that underwent exercise.

These morphological changes in the mice tendons with anabolic steroids and exercise are accompanied by changes in the mechanical properties. Wood *et al.*³ postulated that these biomechanical changes can result in complete tendon failure and predispose to rupture.

Four previous case reports have attempted to link anabolic steroid usage to tendon ruptures. Conclusive cause-effect relationships cannot be established

in any of them but the results of these laboratory studies supports the suggestion that anabolic steroids in exercising individuals played a significant role in their tendon ruptures⁴.

Acknowledgements

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References

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Gerry Haggerty MBChB MRCP Dip. Sports
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- 10.30 am **"The Basics of Soft Tissue Injury"**
Faith Gardner MBBS DIP Sports Medicine, M.O. GB
Squad, World Student Games, Regional M.O. BAF
- 11.30 am Coffee
- 12.10 pm **"Soft Tissue Injury Prevention, Warm-up,
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Martin Rennison BSc (Hons) MCSP MNZSP SRP,
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- 1.00 pm Lunch
- 2.25 pm **"Nutrition and Sports Performance – the
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Lynne Douglas BSc M Phil SRD Dietitian,
Commonwealth Games and Scottish Rugby Union
- 3.20 pm **"Gender Differences in Sport"**
Myra Nimmo BSc PhD, Olympic Athlete, Director of
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- 4.10 pm Tea
- 4.40 pm **"Sports Injuries of the Knee and Hip in
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Malcolm Macnicol MCh FRCS BSc, Surgeon to the
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- 5.50 pm Close
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Chairman: Dr Ian Adams M.D.

- 9.15 am **Introduction:** Rose Macdonald BA MCSP
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- 9.30 pm **"Sporting Injuries of the Knee"**
David Rees M.Ch.Orth.FRCS Leighton Hospital,
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Specialist
- 10.30 am **"Risk of Over-use Injuries in Elite Young
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Alan Hodson MA MCSP SRP. Head, FA Medical
Education Centre, Lilleshall NSC
- 11.20 am Coffee
- 12.00 noon **"Stress Fractures In Sport"**
Graham Holloway MB ChB FRCS, Consultant
Orthopaedic Surgeon in Sports Injuries, Swindon
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- 1.00 pm Lunch
- 2.20 am **"Women in Sport"**
Wendy Dodds BSc MB ChB FRCP, Consultant
Rheumatologist, St Luke's Hospital, Bradford, M.O.
Olympic, Commonwealth and World Student Games
- 3.20 pm **"Pelvic and Groin Injuries"**
Phillip Newton MCSP SRP, Head, Sports Injury
Centre, Lilleshall NSC
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- 4.40 pm **"Risks and Benefits of Injections in Athletes"**
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Royal London Hospital, Crystal Palace National
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