Acceleration Associated Vertebral Fractures - Case Report

Sqn Ldr K Gallagher
Medical Officer Instructor
RAF Centre of Aviation Medicine
Scope

• High G training
• Background to case
• Presentation, investigation, management
• Occupational limitations
• Literature review
High G Training

- Qinetiq Man Centrifuge Facility
High G Training

- Requirements
- Screening and risk assessment
- Follow-up
High G Training

• High G run profiles
• Anti- G protection
• Skeletal force loading
Gz Force Components
Biomechanics of Centrifuge

• Relative centrifugal force $\propto$ radius x $\text{rpm}^2$

• Axial loading plus moment

• Muscle tensing accentuates moment

• Rib cage and chest splinting support compression of vertebrae
Vertebral Compressive Forces

A

Predicted compressive force (N)

0 (No ribcage contribution)
- 50%
- Baseline
- +50%
- +100%

B

Predicted compressive force (N)

0 (No ribcage contribution)
- -50%
- Baseline
- +50%
- +100%

T6 T7 T8 T9 T10 T11 T12 L1 L2 L3 L4 L5
Background

• RAF pilot- 36y male, 12 y experience in FJ (Tornado F3 and BAe Hawk)
• QFI basic fast jet training
• Apr 15- high G training; +7.5 Gz with mid-thoracic pain on second run
• Presented SMC at 4w; referred to PCRF
• Nov 15 referred to RRU, MRI completed
Investigation

- MRI – wedge # T8 / L1 vertebrae
- Referred CA Rheumatology/ Orthopaedics
Investigation

- Rheumatology - DEXA scan osteoporotic
Investigations

- T score - vertebrae – 2.8
- femoral neck -1.3
- Metabolic bone screen - low vit D₃
- Endocrine studies - low normal testosterone
- Gastroenterology - PIL CAM
- MRI - pituitary
Osteoporosis

- Risk factors
- Aetiology - primary / secondary
- Clinical presentation
Further Management

• JMES downgrade
• Follow-up Defence CA Rheumatology/Orthopaedics
• NHS Gastroenterology/Endocrinology
• Occupational health
Management

• Permanent limitation – fit RPAS, ME platforms
• Vitamin D / Calcium supplements/ bisphosphonates?
• Testosterone Jan 17
• DEXA scans 2 yearly monitoring
Occupational Factors

• Prognosis of condition
• Occupational limitations
• Career implications
Medication Approval

- Aviation Medicine Therapeutics Working Group
- Standing Committee on Aircrew Medical Standards

Consideration:
- Testosterone
- Alendronate
Literature Review


