

Anterior cervical fusion and combat flying : A case report

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Spine-related medical problems are known to occur earlier and with added severity in fighter and helicopter aircrew [1,2]. It has been suggested that frequent exposure to high G forces may cause not only acute in-flight neck pain but also premature disc degeneration [3]. An IAF study of incidental findings post-ejection revealed that disc degeneration changes were the commonest (61%) [4]. A survey of cervical spine findings in asymptomatic fighter pilots and also a study of non-ejection cervical spinal injuries revealed a high prevalence of disc degenerative changes among fighter pilots [5,6]. Anterior cervical fusion is one of the modern surgical methods of treatment for Prolapsed Intervertebral Disc (PIVD) in cervical region. Aeromedical opinion regarding reflighting fighter aircrew with cervical PIVD treated surgically is divided among different organisations across the world. The first-ever case in IAF, a fighter pilot with PIVD of C6-C7 disc treated with 'anterior cervical fusion' who was thoroughly evaluated and reflighted back to fighter cockpit is presented. The dilemmas encountered in the aeromedical decision-making in such a case and the varying opinion in world literature on the subject is discussed.

Case Details

A 38 year-old fighter pilot (current on high performance aircraft) with a total flying experience of 2,300 hours developed stiffness of neck and

neck-pain radiating into left upper limb in May 2004. After detailed evaluation, he was diagnosed as a case of PIVD of C6-C7 disc. On 02 June 04, he underwent anterior cervical micro-discectomy and anterior cervical fusion with bone graft. His symptoms resolved after surgery. He was sent on 04 weeks of sick leave followed by a period of observation in non-flying medical category for 24 weeks. Subsequently, he reported to this Institute for evaluation. He was found to be asymptomatic. By then, he was physically active with regular jogging and long walks. Local examination of the cervical spine did not reveal any swelling or deformity. The operation scar was healthy. No wasting was noted in the muscles of upper limbs. There was no local tenderness or paraspinal muscle spasm. Movements of the cervical spine were full and free. No neurological deficit could be demonstrated. Hand grip on left side was 38 kg (peak) and 26 kg (sustained after 30 sec) while on right side it was 35 kg (peak) and 25 kg (sustained after 30 sec).

He was comfortable in performing the functional tests which included squatting on the ground with feet flat, jogging on the spot for 10 sec and jumping from a height of 4 ft. He tolerated the vibration stress well and remained asymptomatic throughout the 25 min duration. In

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the medical evaluation run in the human centrifuge, his G-level and duration tolerance was found to be adequate for fighter flying. X-ray cervical spine in flexion and extension views were taken to assess the stability and alignment of the cervical spine. They did not reveal any features of instability. MRI cervical spine revealed fusion of C6-C7 with loss of intervertebral disc space. Other findings were commensurate with his flying experience and age. Neurosurgical opinion recommended restricted flying category as the healing was complete.

Discussion

Aeromedical concerns in a case of cervical PIVD after surgery include recurrence of symptoms such as pain and discomfort which might degrade flying performance, potential for re-injury, vertebral joint instability and subsequent failure of the vertebral column giving rise to sudden incapacitation and permanent disability.

After surgery, it is generally advisable to wait for 3-4 months before returning to the cockpit to ensure that healing is complete [7]. Individuals who experience recurrent symptoms require protection from high-G forces and may be permanently unsuited to the fast jet role [8].

In the IAF, non-flying medical category is recommended till treatment (conservative or surgical) has been afforded, symptoms and signs have completely resolved and radiographs demonstrate healing with no instability [9]. Thereafter, disposal is on a case-to-case basis after complete human engineering assessment and neurosurgical opinion. Also, at entry level, complete block (fused) vertebra in cervical and / or dorsal spine at a single level is considered fit for flying duties [9].

In US Navy, waiver is recommended including ejection seat and rotary wing aircraft in cases of anterior cervical fusion at one level if the following criteria are fulfilled: 6 months after surgery if there is no pain or radicular symptoms and radiographs reveal healing with no instability. However, in cases of anterior cervical fusions at two levels, even if above criteria are fulfilled, waiver is recommended *excluding* ejection seat aircraft and rotary wing aircraft [10].

In US Air Force, waivers are considered 3-6 months after successful treatment. It was seen that 95% of cases received waivers for flying duties, two-thirds of whom were corrected with surgery or chemonucleolysis. Occasionally, FC-II A waiver (fit for ejection seat but restricted from high-G performance aircraft) or FC-II B waivers (restricted from ejection seat aircraft) are also issued [11]. In US Army, waiver is recommended with restriction from ejection seat aircraft [12].

In the IAF in the recent past, aircrew with symptomatic disc disease of the cervical spine treated conservatively (non-surgically) have been returned to full flying duties after due follow up and evaluation, including high performance aircraft. Considering all the abovementioned facts, the aviator was recommended medical category A3G2(T-12) (restricted flying) and advised review with executive report on flying. He flew 03 sorties in a high performance aircraft which involved high-G turns and neck movements under G-forces. He did not experience any symptoms. The executive report on flying was complimentary. Hence, he was upgraded to medical category A2G2. After detailed deliberations on the nature of disability, long term sequelae and evidence from follow up studies of disc disease treated surgically, a considered opinion was arrived at by the

approving authority. He was recommended fit for fighter flying.

Conclusion

Conservation of trained manpower and prevention of attrition of operational aircrew on medical grounds without compromising flight safety and personal safety of the aircrew is the need of the hour. The need for more evidence-based Aerospace Medicine practice cannot be overemphasised.

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