“Jahwari’s Position” – A Novel Operating Room Setup for Antegrade Humeral Nailing: Surgical Technique and Initial Experience

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Learning Point of the Article:
AGHN with traditional positioning causes scarcity of space available for the surgeon, assistant, scrub nurse, X-ray technician, risks while performing distal interlocking which are addressed by Novel room Set up called ‘Jahwari’s Position’.

Abstract

Introduction: Ante Grade Humeral Nailing (AGHN) with traditional positioning causes crowding at the patient’s head end, cramming for the surgeon and anaesthetist, scarcity of space available for the scrub nurse and X-ray technician, and neurovascular risks while performing distal interlocking. Minimal literature is available regarding the optimal position and setup in the operating theatre (OT). The primary objective was to describe, how effective novel Jahwari’s position is by assessing the ergonomics for OT personnel, OT time, and radiation exposure. A secondary objective was to evaluate the safety of inserting distal interlocking screws.

Surgical Technique: The head of the patient is placed away from the anaesthetist and their equipment, which were placed at the foot end of the patient. The patients were connected to the anaesthesia machine with a long airway extension, which was anchored to the table. The C arm machine was brought from the contralateral side and did not have to be moved. The scrub nurse and the surgeon were placed at the head end of the patient. Pregnant patients, those aged <18 years, and those with open fractures were excluded from our study. A single consultant operated on all cases for standardization. OT time and radiation exposure were monitored.

Conclusions: Inspired by our use of this position for cervical spine patients for more than a decade, Jahwari’s position and setup were innovated. This setup gives ample room for the anaesthetist at the foot end. The surgeon and assistants are free from cramming at the head end. Complementarily, it provides ample space for the X-ray technician and scrubs nurse.

Keywords: Jahwari position, antegrade humeral nailing, modified lateral position.
Whereas in traditional supine or traditional lateral positions crowding and cramming at the head end remains an issue. In addition, in beach chair and supine positions less favorable anteroposterior distal locking is mandatory.

To the best of our knowledge, there is no description in the literature of the novel setup we are describing. The primary objective was to describe and find out the effectiveness of the novel room setup by assessing the ergonomics for OT personnel, OT time, and radiation exposure. A secondary objective was to evaluate the safety of inserting distal interlocking screws.

Surgical Technique

The patients were placed in a novel setup using Jahwari’s position with the head of the patient placed away from the anaesthetist from the foot end. This setup gives ample room for the anaesthetist at the foot end. Likewise, the surgeon is also free from cramming at the head end where they usually stand during the surgical procedure.

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After the patient is positioned as described above, the surgical technique we did is as follows:

**Antegrade humeral nailing**

The clavicle, acromion, and coracoid process were identified and marked. The axillary nerve was approximately marked 5–7 cm distal to the angle of the acromion. Following the incision of the skin and subcutaneous tissues, the deltoid was split. Entry through the greater tuberosity is not recommended due to supraspinatus tendon injury. The entry point was thus through the rotator interval. A guidewire was passed, and sequential reaming was done.

After passing the nail over the guidewire and confirming its position with fluoroscopy, proximal locking was cautiously performed using the jig because of the proximity of the axillary nerve (Fig. 3). In traditional positions such as beach chair or supine, distal locking has to be performed anteroposterior, which poses more risk to the neurovascular structures; whereas in Jahwari's position or even in the traditional lateral position where posteroanterior distal locking was possible, the risk to neurovascular structures dramatically reduced as depicted in the schematic diagram (Fig. 4) and led to better ergonomics (Fig. 5).

As far as OT time is concerned Jahwari's position took 30 min less on average compared to other positions. Ninety percent of OT staff favoured the new position especially due to lack of hindrance from each other.

The operative time for the Jahwari's position group ranged from...
Discussion
Barbagello et al. debate how lack of optimization of the OT, arrangement, and flow leads to increased cost and disturbance in performing surgical procedures. They mention that most OTs are designed for elective setup, not emergencies, and concluded that OT optimization led to the best use of human resources and OT personnel, increased patient safety, and better surgical team outcomes [8]. Wong et al. emphasized three factors that could affect outcomes based on OT setup optimization, namely physical factors (noise and light), human factors of the patient or OT staff (ergonomics: patient and surgeon positioning), and surgeon-related factors (fatigue and stress). They mentioned that optimizing the OT would mean optimizing these factors, with better outcomes for the patient and surgeon [9].

The beach chair layout allows the surgeon to address multiple upper limb issues that may be associated with humeral shaft fractures, including shoulder dislocations and glenoid injuries. However, the setup is time-consuming and cumbersome. AP distal locking poses constant risks to the neurovascular structures and is challenging against a moving target [5, 10].

The traditional supine and lateral positions are preferred over the beach chair position for patient monitoring and safety. However, crowding at the head end remains problematic. Whereas, the latter position facilitates safe, posteroanterior distal interlocking, minimizing neurovascular risks [6]. All these disadvantages of traditional positions are obviated by our novel position including crowding at the head end. In addition, performing posteroanterior distal interlocking without neurovascular risk was an added benefit. Above 90% of staff favoured the novel position as mentioned in the results. Documented radiation exposure to the surgical team and patient was less compared to the traditional methods.

Distally, the humerus is triangular, with the apex pointing anteriorly when viewed in cross-section. This risks slippage of the drill bit at the apex during anteroposterior interlocking. In the beach chair position, this risk increases since the surgeon work on a moving target. Therefore, the lateral position (with posteroanterior distal locking screws), whether traditional or Jahwari’s position, is considered better.

Conclusion
Inspired by our use of this position for the past 10 years, as time tested and efficient it is - Jahwari’s position, with its associated layout, allows the anaesthetists, surgeons, scrub nurses, and C-arm technician to work comfortably. Furthermore, the risk of the X-ray technician contaminating the operative field is also minimized, with ample space available for manoeuvring the C-arm. Likewise, the scrub nurse has adequate space to keep trolleys uncontaminated. These factors reduce the OT time, patient and staff radiation exposure and allow posteroanterior insertion of distal locking screws in safe manner.

Clinical Message
In our experience, optimizing the OT layout and positioning while performing AGHN has an impact on patient safety, comfort levels for all the members involved in the surgery, reducing OT time, and radiation exposure compared to traditional positions and layouts.

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