SVOA Orthopaedics

e-ISSN 2752-9576

ScienceVolks Open Access

Research Article

Anterior Trans-Muscular Approach to Hip (AP's Access)

Amol Yashwant Patil[1*], Sushrut Babhulkar[2], Nitin Kimmatkar[3], Ashutosh Apte[4], Amol Kadu[5], Aniruddha Sonegaonkar[6]

[1]Ganga Clinic and Sushrut Institute of Medical Sciences, Nagpur, India.

[2]Sushrut Institute of Medical Sciences, Nagpur, India.

[3]IGGMC & Mayo General Hospital, Nagpur, India.

[4]Sawali Orthopaedic Hospital, Nagpur, India.

[5]Upacharya Hospital, Nagpur, India.

[6]NKP Salve Medical College & Lata Mangeshkar Hospital, Nagpur, India.

***Corresponding Author:** Dr. Amol Patil, MBBS, D-Orth, DNB (Orth), M. Ch (Orth), Ganga Clinic, 3545/B/6, Samaj Ekta Society, Ganga Clinic Road, New Manish Nagar, Somalwada, Nagpur PIN – 440005, India.

https://doi.org/10.58624/SVOAOR.2026.06.004

Received: January 01, 2026

Published: January 27, 2026

Citation: Patil AY, Babhulkar S, Kimmatkar N, Apte A, Kadu A, Sonegaonkar A. Anterior Trans-Muscular Approach to Hip (AP's Access). *SVOA Orthopaedics 2026*, 6:1, 28-41. doi: 10.58624/SVOAOR.2026.06.004

Abstract

Objective: To introduce an anterior trans-muscular approach to the hip joint for intra-capsular neck femur (ICNF) fracture fixation.

Design: Prospective study of 37 hips in 36 patients treated from January 2022 to December 2023. Patients were operated by anterior trans-muscular approach (AP's Access) and fixed by Cancellous Cannulated screws or by angle stable side plate construct (DHS, FNS) along with anti-rotation screws with or without anteromedial buttress plate. Aim was to achieve anatomic reduction, absolute stability, compression at fracture site without losing neck length. Regular follow up for wound healing, fixation failure, union of fracture, osteonecrosis, infection and other possible complications done.

Setting: Single center

Patient Selection Criteria: Patients between 18 to 65 years with AO/OTA type 31B1, 31B2, 31B3 & Gardens type III & type IV ICNF fracture included with minimum follow-up of 24 months. Pathological fractures and previous hip surgery patients were excluded.

Outcome Measures and Comparisons: Garden's alignment index (GAI) used to assess the quality of reduction. Harris Hip Score (HHS) used for functional assessment.

Results: "AP's Access" gives excellent exposure and ease of reduction. Out of 37 hips 36 went on to unite with one hip requiring arthroplasty. According to GAI, grade I reduction in 28 and grade II in 9 patients. HHS score suggests excellent outcome in 28, good in 5, fair in 2 and poor in 1 patient. No patient had limp, infection, paraesthesia, thromboembolism.

Conclusions: "AP's Access" is an anterior trans-muscular approach with a feasible modification of established approaches which addresses the apprehensions related with other anterior approaches and showing early promising results.

Level of Evidence – Level II

Keywords: *AP's Access, ICNF, Fracture Neck Femur, Anterior Approaches*

Introduction

Hip joint is the commonest surgically explored joint. It is affected by variety of conditions. Trauma to the hip joint is the most common indication which requires surgical management. This prospective study utilizes new variation of Watson-Jones approach namely "AP Access" to treat intracapsular neck femur (ICNF) fractures. The incidence of low energy ICNF fractures in geriatric population increasing at an exponential rate as a result of the longevity of the general population.[1,2] However, with increasing incidence of high injury road traffic accidents ICNF fracture becoming commoner in younger population also. Presentation may vary from occult fracture to fracture dislocation. There is lack of consensus with regards to management, surgical approach, method of fixation and choice of implant. It requires anatomical reduction, absolute stability with maintaining length of neck femur for best outcome. Anatomical reduction is possible with closed reduction but it is difficult especially in displaced fractures. Anterior hip approaches are preferred but are sparsely used mainly because of lack of familiarity and apprehension associated with them. Despite advances in surgical techniques and medical care, the risk of non-union and osteonecrosis have not changed appreciably in the last 50 years.[3] Surgical approach becomes a critical point in open reduction and internal fixation (ORIF) as proper visualization is important for reduction. Smith-Peterson, Heuter's, Watson-Jones are the currently favoured approaches with their pros & cons. Apprehension associated with these approaches needed to be addressed. This study introduces a new variation of anterolateral Watson-Jones approach to femoral neck, namely "AP's Access" which can be an efficient and safe alternative for ORIF. Protecting the blood supply of the femoral head from being infringed can largely minimize the complications.[4] In recent years, numerous studies have demonstrated promising outcomes of femoral neck fracture linked to the quality of reduction.[4-6] The inferior retinacular artery which usually escapes the initial trauma needs to be preserved during reduction and implant placement. ORIF has advantages of direct look and restoration of normal function. It's a well proven fact that repeated attempt of closed reduction aggravates vasospasm and distortion of the arteries in the round ligaments of femur, may leading to vascular embolism, and then destroy the blood supply to the femoral head.[7] Hence an open surgical approach to achieve anatomic reduction is advocated if closed reduction has failed.[8] Some study also indicates the higher re-operation rate in patients treated with ORIF for fracture neck femur.[4] The Smith-Peterson approach gives good exposure but often at the cost of cutting rectus femoris. Heuter's approach gives excellent visualisation of head and neck femur but lateral femoral cutaneous nerve, femoral nerve & ascending branches of lateral circumflex femoral arteries are at risk. In addition to this Smith-Peterson & Heuter's approach requires separate incision for implant placement. Watson-Jones approach gives good visualisation of the basal part of femoral neck, but the sub-capital part remains poorly visible.[8] "AP's Access" to neck femur overcomes the limitations and apprehension associated with other anterior approaches.

Methods

It's a prospective study of 37 hips in 36 patients treated between January 2022 to December 2023. Ethical clearance was obtained from the institutional ethical committee. Out of 36 there were 20 males and 16 females between 34 to 64 years. 21 patients had ICNF fracture on right side, 14 on left side and 1 patient had bilateral ICNF fracture. They reported for pain around the groin, shortening of limb with attitude of external rotation of the leg. All patients as a protocol assessed according to ATLS protocol. Once stabilized all patients underwent X ray of pelvis with both hips antero-posterior view in internal rotation and lateral view of affected hip. Fractures were classified as per AO/OTA, Garden's and Pauwels classification system. 23 patients had Garden's type III & 13 patients had Garden's type IV fracture. Patients demographic details and written informed consent obtained and recorded. All surgeries were performed by the corresponding author.

Inclusion & Exclusion Criteria

Patients between 18 to 65 years with AO/OTA type 31B1, 31B2, 31B3 & Gardens type III & type IV ICNF fracture irrespective of its Pauwels type included with minimum follow-up of 24 months. Patients with pathological fractures and previous hip surgery excluded.

All patients were operated by "AP's Access" and fixed by angle stable side plate construct either by Dynamic Hip Screw (DHS) with an anti-rotation Cannulated Cancellous (CC) screw or Femoral Neck System (FNS) with or without anteromedial buttress plate and standalone CC screws (6.5 mm partial or fully threaded screws) with or without anteromedial buttress plate. Following type of ICNF fracture reconstruction done in 36 patients.

ip joint is the commonest surgically explored joint. It is affected by variety of conditions. Trauma to the hip joint is the most common indication which requires surgical management. This prospective study utilizes new variation of Watson-Jones approach namely "AP Access" to treat intracapsular neck femur (ICNF) fractures. The incidence of low energy ICNF fractures in geriatric population increasing at an exponential rate as a result of the longevity of the general population.[1,2] However, with increasing incidence of high injury road traffic accidents ICNF fracture becoming commoner in younger population also. Presentation may vary from occult fracture to fracture dislocation. There is lack of consensus with regards to management, surgical approach, reconstruction done in 36 patients.

a. CC Screw (10)

b. CC + Anteromedial buttress plate (2)

c. DHS + CC Screw (17)

d. FNS (7)

e. FNS + Anteromedial buttress plate (1)

Garden's alignment index (GAI) used to assess the quality of femoral neck reduction. Functional assessment done by Harris Hip Score (HHS). Regular follow up for 24 months done to observe for wound healing, fixation failure, deep vein thrombosis (DVT), fracture union, osteonecrosis, infection, myositis ossificans, superior gluteal nerve injury, and other complications.

Operative Technique

The procedures were carried out under spinal or general anaesthesia. "AP's Access" is possible with or without traction attachment on the radiolucent table. Traction table allows unhindered movements of image intensifier (IITV) and supine position is useful for intra-operative movements of affected extremity for buttress plate fixation in Pauwels type II & III ICNF fractures. Lateral view can be taken by lifting contralateral extremity out of IITV trajectory in supine position. Prepping and draping done with anterior superior iliac spine (ASIS), greater trochanter as visible & palpable landmarks. One attempt of closed reduction done. If the reduction is not satisfactory according to GAI then ORIF is proceeded.

First, the anterior superior iliac spine (ASIS) and greater trochanter (GT) are marked. (Figure 1). Incision starts 2 cm distal and 2 cm lateral to ASIS going obliquely towards the centre of GT (Part A). Incision is slightly curved to become along the shaft of femur mainly for side plate fixation usually 4 cm to 6 cm (Part B). Part A is useful when fixation is done by CC screw only. The junction of part A & part B of the incision is slightly curved, not at an acute angle for better wound healing. Skin & subcutaneous tissue is separated and haemostasis is achieved. Underlying fascia can be identified by its colour. Fascia overlying Tensor Fascia Lata (TFL) muscle is thin & bluish in colour whereas fascia overlying Gluteus Medius (Glu.Med) muscle is thick & whitish in colour. Another identification is by perforator which can be found piercing TFL fascia. TFL fascia is split along its fibers and separated from TFL muscle by blunt dissection. TFL muscle reconfirmed by tracing its fibers towards ASIS. The TFL muscle is then split using blunt artery forceps in the anterior and posterior half. The posterior half of TFL muscle along with Glu.Med retracted poster-laterally using cobra Hohman's retractor levering on anterolateral aspect of joint capsule (Fig 2). Similarly, anterior half of TFL muscle along with Rectus Femoris muscle retracted anteromedially levering on the anteromedial aspect of the joint capsule. The anterior aspect of the hip joint capsule is visible now. An inverted T shaped capsulotomy is done, which gives way for haematoma to come out and decreasing tamponade effect. Tag suture taken over each limb of capsule and capsulotomy done carefully not to injure underlying bone, cartilage and labrum. The Extra-capsular retractor can be placed in a similar intra-capsular location. Now since the fracture is under direct vision it can be reduced using joy-sticks. The dissection underlying the part B of incision involved thick fascia of iliotibial band which is incised along its axis. Vastus lateralis muscle can be lifted anteriorly to expose underlying femoral shaft.

Reduction Strategy: - One 2 mm K wire is drilled in the femoral head to control femoral head rotation and to align it with distal fragment. One Steinman pin or 3 mm K wire is driven from the lateral aspect of GT through the femoral neck towards the femoral head but not coming out of distal fragment. This Steinman pin will control distal fragment. Using these joy-sticks, the head fragment is aligned with the distal fragment under direct vision and IITV guidance. Once satisfactory reduction is achieved, it is held temporarily with another 2.5 mm K wire drilled from the lateral aspect of GT to the subchondral region of the femoral head. If needed additional K wire can be passed to firmly hold the reduction.

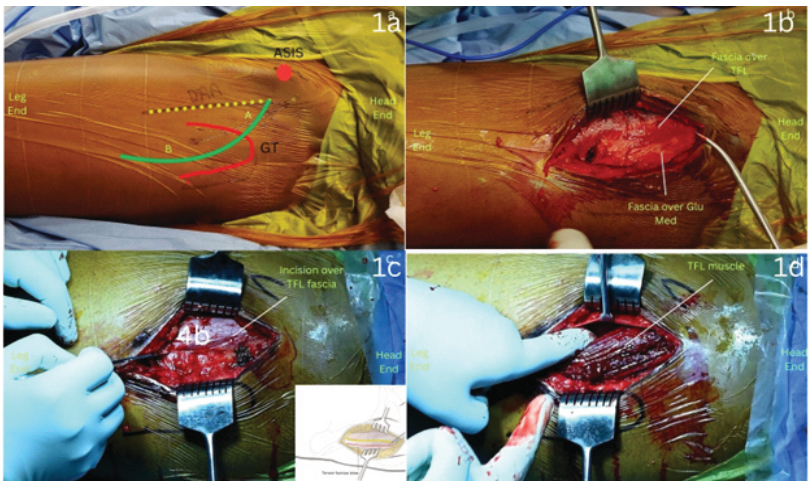

Figure 1(a,b,c,d). - a. Surface landmark and incision (part A & part B) for AP's Access. b. Shows fascia overlying TFL & Glu. Med after separation of skin & subcutaneous tissues. c. shows incision over the TFL fascia along the fibers. d. Separation of TFL muscle belly from the fascia.

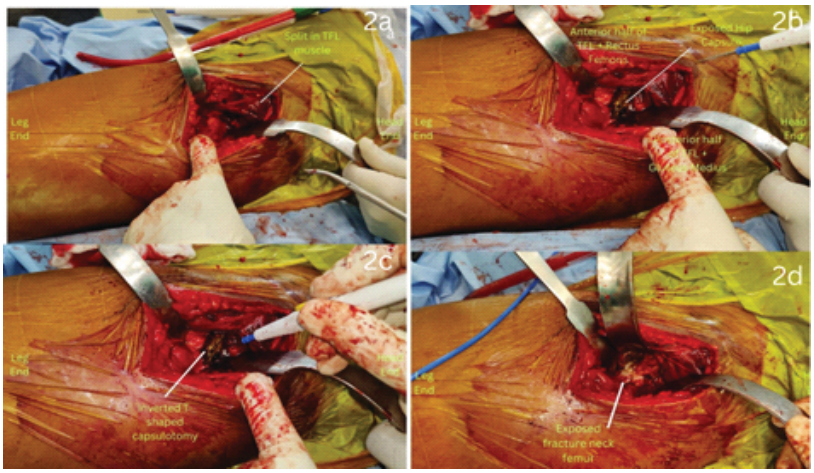

Figure 2 (a,b,c,d). - a. Blunt split in TFL muscle along its fibers into anterior and posterior half. b. Retraction of anterior half of TFL muscle & Rectus femoris muscle anteriorly and posterior half of TFL muscle & Gluteus Medius muscle posteriorly exposing hip capsule. c. Inverted T-shaped capsulotomy. d. Exposure of femoral neck fracture.

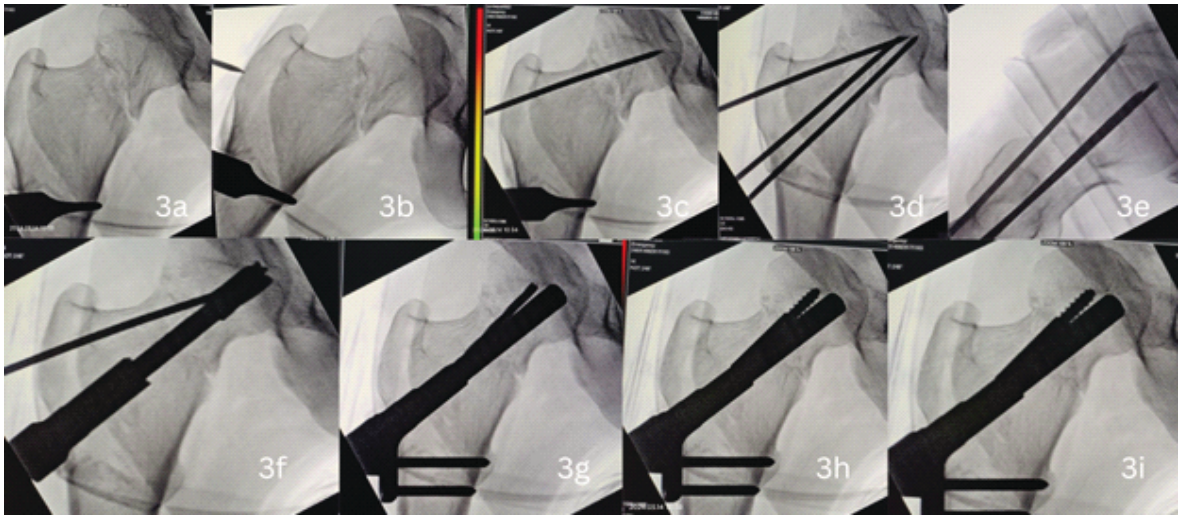

Figure 3 (a to i). Showing steps of Open reduction and FNS for ICNF fracture. **3a.& 3b-**Fracture reduction using joystick and Hohman's retractor. **3c & 3d & 3e -** Provisional fixation using K wires**. 3f.** Definitive fixation using FNS. **3g, 3h & 3i.-** Showing gradual intra-operative compression using compression device.

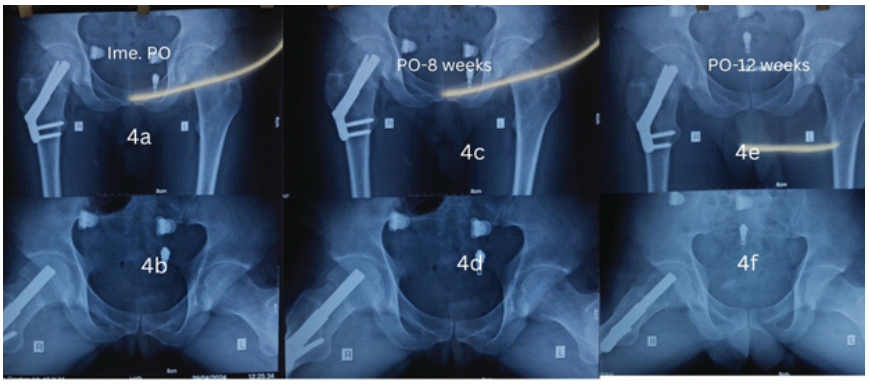

Figure 4 (a to f). - Showing follow up X rays. **4a.& 4b-** Immediate post-operative X-rays. **4c.& 4d-** Post-operative 8 weeks X rays. **4e.& 4f-** Post-operative 12 weeks X rays showing complete healing.

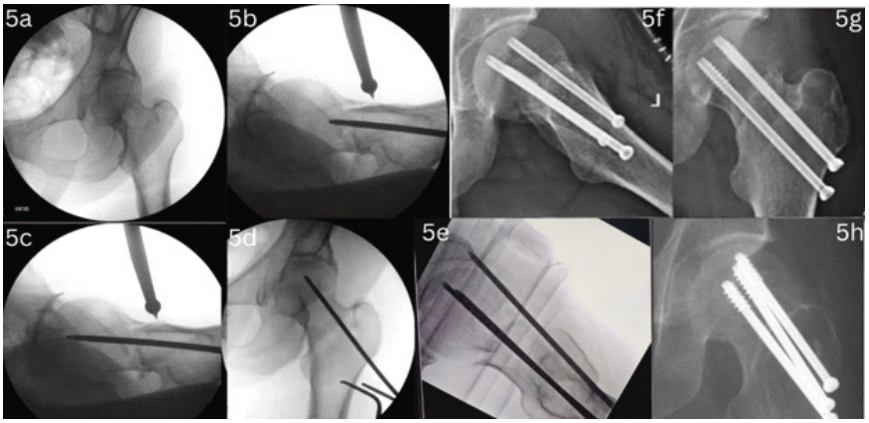

Figure 5 (a to f). - Showing steps of reduction and CC screw fixation. **5a, 5b, 5c -** Reduction of ICNF fracture using ball tip spike. **5d, 5e** - Temporary hold by K wire & placement of CC screw guide wire. **5f & 5g -** Immediate post-operative X-rays. **5h -** Post-operative 3 months X rays showing complete healing.

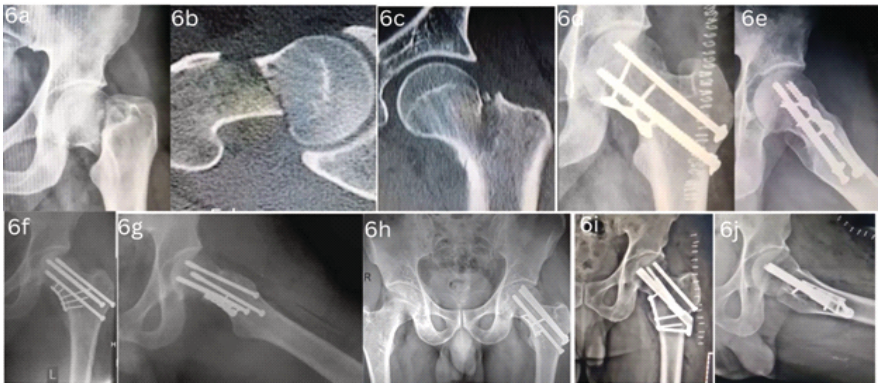

Figure 6 (a to j). - Showing adjuvant anteromedial plate fixation in Pauwel's II & III type ICNF fractures. **6a, 6b, 6c -** preoperative X ray & CT Scan. **6d, 6e -** showing CC screw and adjuvant anteromedial buttress plate fixation in the same patient shown in fig 6a, 6b, 6c**. 6f, 6g, 6h -** showing CC screw and adjuvant anteromedial buttress plate fixation in another patient. **6i, 6j -** showing FNS and adjuvant anteromedial buttress plate fixation.

Care should be taken to keep the trajectory for definitive fixation device wires empty. Then definitive fixation is done maintaining the ICNF fracture reduction (Fig 3 to Fig 5). In 3 patients, after primary fixation with (CC screws, FNS) additional anteromedial buttress plate applied at the apex of fracture. 3 to 4 Hole (2.7 mm or 3.5 mm) one third tubular or reconstruction plate was used. Plate is fixed at the apex of fracture to decrease the shear forces. Plate is fixed at 6 o'clock position to prevent any impingement and to avoid the course of Inferior retinacular artery which is usually located at 8 or 8.5 o'clock position (Fig 6). While fixing these fractures standard fixation protocols to remain perpendicular to fracture site for optimal compression is followed (Fig 7). The principle followed was to achieve absolute stability and compression at fracture site without losing neck length. Stability of fracture fixation confirmed under IITV. Drainage tubes were not kept. Betadine & saline washes given. Capsulotomy is closed by approximating tag sutures. TFL Fascia & Iliotibial tract, subcutaneous tissue and skin is closed. (Fig-8)

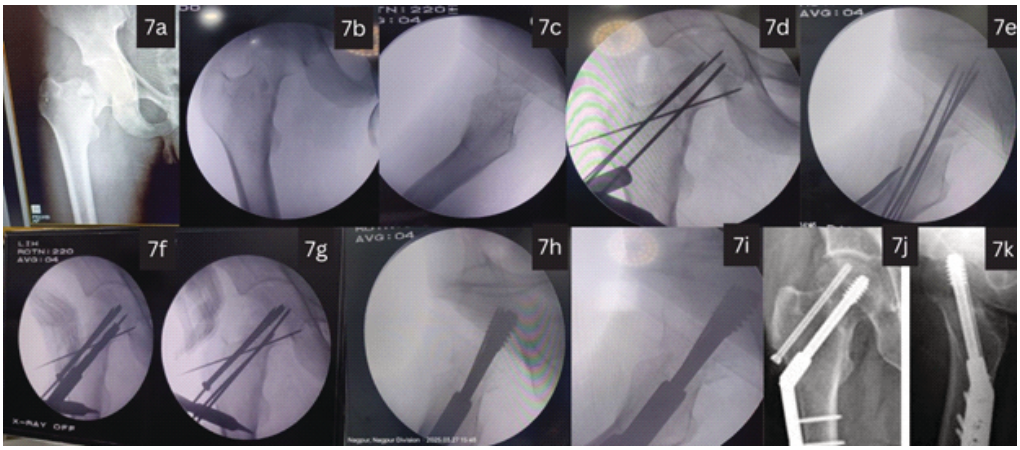

Figure 7 (a to k) - Showing steps of reduction and DHS fixation for ICNF fractures. **7a, 7a -** Preoperative X ray**. 7b, 7c, 7d, 7e-** showing reduction steps under IITV. **7f, 7g -** showing CC screw fixation. 7h, 7i - showing CC screw and DHS fixation. 7j, 7k - showing 3 months post-op X ray with healed ICNF fracture.

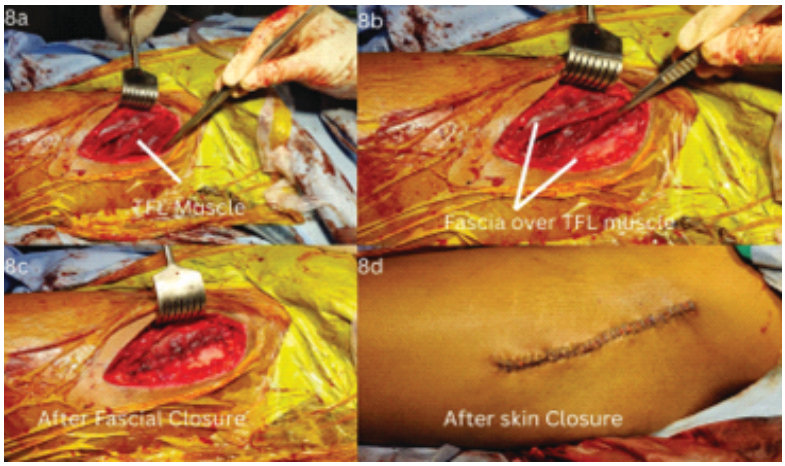

Figure 8 (a to d) - Showing steps closure. **8a, 8b –** showing TFL muscle and fascia overlying it. **8c-** fascial closure**, 8d –** Skin closure

Post-operative protocol

Ankle pumps, quadriceps, hamstring exercises started as soon as anaesthesia weaned off. Bed side sitting and walking non-weight bearing (NWB) commenced next day. High risk patients with co-morbidities received oral Apixaban 5 mg given for 6 weeks. Patients mobilized NWB with walker for 3 months. Weight bearing commenced after 3 months. During this time the patients monitored for radiological & clinical signs of healing. Minimum follow up of 24 months is observed. HHS was recorded and assessed as functional outcomes. (Table-1)

Table 1. Showing Case Summary data.

atient Name	Age/ Sex	Injury Side	Garden's Type	AO/OTA	Pauwel's Type	Fixation Modality	Complication	Harris Hip Sc		
								3 months	6 months	12 mo
Patient 1	34 Y/M	Right	Type III	31B1	Type II	FNS	-	72.2	78.2	82
Patient 2	46 Y/M	Right	Type IV	31B2	Type III	CC Screw	-	69.3	78.3	8
Patient 3	49 Y/F	Left	Type III	31B3	Type II	DHS +CC Screw	-	70.7	77.7	82
Patient 4	60 Y/M	Right	Type IV	31B2	Type I	CC Screw	-	68.4	74.3	82
Patient 5	38 Y/M	Right	Type III	31B1	Type II	FNS + Buttress Plate	-	71.2	78.2	8
Patient 6	52 Y/F	Left	Type III	31B2	Type I	DHS +CC Screw	-	65.6	72.6	79
Patient 7	59 Y/F	Right	Type III	31B2	Type I	DHS +CC Screw	-	65.6	72.4	76
Patient 8	44 Y/M	Right	Type IV	31B1	Type III	CC Screw + Buttress Plate	-	67.7	70.7	78
Patient 9	59 Y/M	Right	Type III	31B2	Type II	FNS	-	64.3	69	73
Patient 10	64 Y/F	Right	Type III	31B3	Type I	DHS +CC Screw	-	69.7	74	7
Patient 11	41 Y/M	Left	Type III	31B2	Type II	DHS +CC Screw	-	71.2	72	78
Patient 12	62 Y/M	Right	Type III	31B3	Type II	DHS +CC Screw	-	58	60.4	62
Patient 13	56 Y/F	Left	Type IV	31B2	Type I	CC Screw	-	72	72.4	8
Patient 14	47 Y/M	Left	Type III	31B1	Type I	FNS	-	69.7	70.2	7

Table 1 continued....

Patient 15	59 Y/M	Right	Type III	31B2	Type II	FNS	-	65.6	66.2	7
Patient 16	42 Y/F	Right	Type III	31B3	Type II	DHS +CC Screw	-	72.2	78	8
Patient 17	57 Y/M	Right	Type III	31B2	Type I	DHS +CC Screw	-	70	72	7
Patient 18	61 Y/M	Left	Type IV	31B2	Type II	FNS	-	64	66	7
Patient 19	33 Y/F	B/L	Type IV	31B2	Type I	CC Screw	-	71	71	8
Patient 20	45 Y/M	Left	Type III	31B3	Type II	DHS +CC Screw	-	68.7	70	7
Patient 21	58 Y/M	Right	Type IV	31B2	Type I	CC Screw	-	65.6	70	7
Patient 22	51 Y/F	Left	Type IV	31B2	Type III	CC Screw + Buttress Plate	-	59.2	67	7
Patient 23	49 Y/M	Left	Type III	31B2	Type I	DHS +CC Screw	-	60.3	68.3	7
Patient 24	59 Y/M	Right	Type III	31B2	Type II	FNS	-	57.3	59	68
Patient 25	62 Y/F	Left	Type III	31B2	Type II	DHS +CC Screw	-	58.4	60.2	69
Patient 26	56 Y/M	Left	Type IV	31B3	Type I	DHS +CC Screw	-	69.3	78.2	86
Patient 27	60 Y/F	Right	Type IV	31B3	Type II	DHS +CC Screw	-	63.5	69.7	76
Patient 28	61 Y/F	Left	Type III	31B2	Type I	CC Screw	-	62.2	69.7	74
Patient 29	58 Y/M	Left	Type III	31B1	Type I	CC Screw	-	64.8	73.4	7
Patient 30	49 Y/F	Right	Type IV	31B2	Type II	DHS +CC Screw	-	70.2	79.1	89
Patient 31	60 Y/F	Right	Type III	31B2	Type II	DHS +CC Screw	-	66.3	70	77

Table 1 continued....

Patient 32	59 Y/M	Left	Type IV	31B2	Type II	FNS	-	64.7	73.4	77
Patient 33	55 Y/M	Right	Type III	31B1	Type I	CC Screw	-	70.4	78.3	89
Patient 34	62 Y/F	Left	Type III	31B2	Type II	CC Screw	Loss of Fixation	32	84.1	89
Patient 35	50 Y/M	Right	Type III	31B3	Type II	DHS +CC Screw	-	64.8	73.8	77
Patient 36	61 Y/F	Right	Type IV	31B2	Type III	CC Screw		62.2	68.2	73
							Mean Deviation	**65.50833 333**	**71.833333 33**	**78**
							Standard Deviation	**7.177240 815**	**5.5529142 93**	**5.937 7**

Results

AP's Access" allows good reduction of ICNF fracture which we assessed by GAI in all 37 hips. 36 hips had radiological union of ICNF fracture between 3 to 5 months. Only 1 hip in a 62-year female had loss of fixation in the fourth month eventually leading to arthroplasty.

Harris Hip Score (HSS) is utilized to measure functional outcome of the 36 patients (37 hips). HSS was recorded at each follow up visit mainly 3 months, 6 months, 12 months, 24 months. HHS suggests excellent outcome in 28 patients, good in 5 patients, fair in 2 and poor in 1 patient. (Figure-9)

One patient who got total hip arthroplasty observed a small period of limp. Other possible complications like myositis ossificans, superior gluteal nerve injury, DVT, embolism, infection, non-union were not seen in this cohort. "AP's Access" gives all the exposure benefits of Heuter's approach and fixation benefits Watson-Jones approach without having downsides of these approaches. Mean deviation from 3 months to 24 months shows significant improvement in Harris Hip Score. (Table-1)

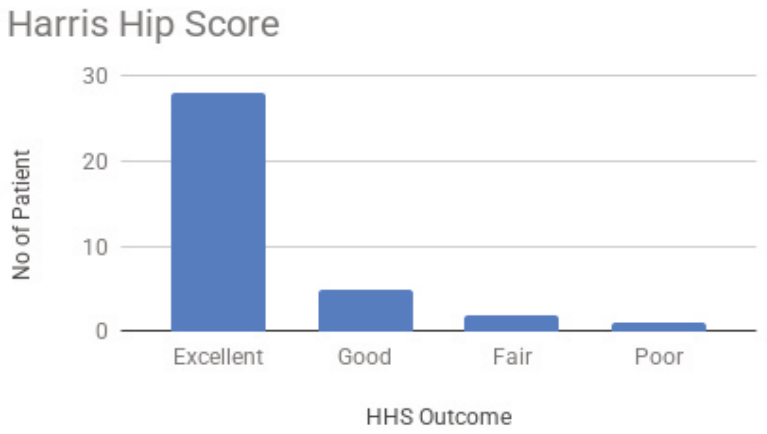

Figure 9. Patients outcome according to Harris Hip Score.

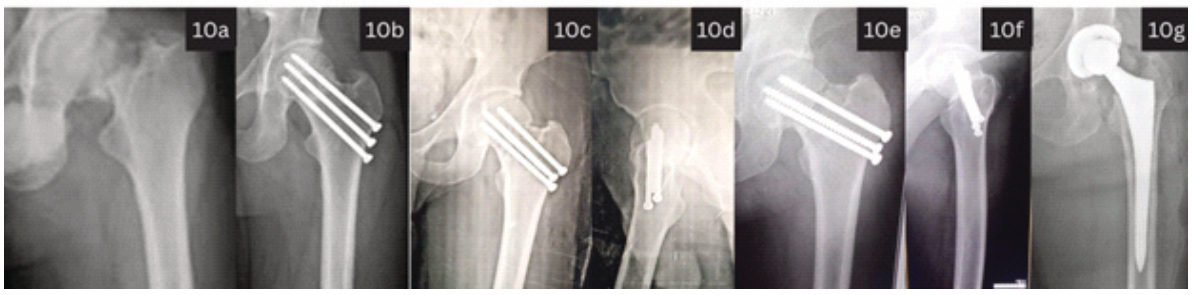

Figure 10 (a to g). - Showing fixation failure ultimately leading to total hip arthroplasty. **10a -** Gardens Type III fracture**, 10b -** anatomical reduction and CC screw fixation**, 10c,10d -** Post op 3 months, **10e & 10f** - 4 months post-op X ray showing failure of construct. **10g** - total hip arthroplasty.

Table 2. Showing Comparative analysis of Anterior approaches to Hip.

	AP's Access	Watson-Jones	Heuters	Smith-Peterson
Position	Supine	Supine & Lateral	Supine	Supine
Plane	Through TFL	TFL & GM		
	TFL & Sartorius	TFL & Sartorius		
LFCN Risk	-	-	+	++
Femoral Nerve Risk	-	-	+	+
Intra-op Bleeding	-	-	+	+
Visualization	Excellent	Subcapital # - Limited		
Basicervical # - Good	Excellent	Excellent		
Buttress Plate application	Yes	Difficult	Yes	Yes
Incision for implant	Same Incision	Same Incision	Separate Incision	Separate Incision
Fluroscopy	Yes	Yes	Yes	Yes
Use of Traction Table	Possible	Possible	Difficult	Difficult
Wound Healing	No issue	No issue	Issues	Issues
Post-op Limp	No	Possible	No	No

Discussion

ICNF fractures are common hip injuries caused by transmitted or twisting force and are primarily caused by rotational and angling stresses from top-down forces acting on the femoral head and neck. [9,10] Osteoporosis and other co-morbidities decrease the energy required for such insult. Even in young adults the incidence is increasing year by year.[11] At the same time, patients with femoral neck fracture are prone to non-union and femoral head osteonecrosis, which seriously affects the prognosis.[12] Its intra-capsular location, absence of periosteum makes secondary healing difficult. Manipulative reduction (Open or closed) and internal fixation are favoured treatment for ICNF fractures.[13] Anatomical reduction is aimed to restore the patient's anatomy and femoral head blood supply. Especially in young and middle-aged patients, internal fixation has a positive effect on preventing long-term complications like femoral head osteonecrosis and non-union after fracture surgery. [14] The quality of reduction, more than time to surgery, has the most impact on optimizing outcomes and function. There is no consensus in the best fixation construct for these fractures. Neck shortening and varus collapse are the most common challenges of the current fixation options.[9,10] In patients with good bone quality, preservation of the natural hip anatomy and mechanics is a priority as their high functional demands and young age preclude their candidacy for replacement procedures.[15] The biomechanical challenges of femoral neck fixation and the vulnerability of the femoral head blood supply lead to a high incidence of non-union and osteonecrosis. Undisputedly, anatomic reduction and stable internal fixation are essentials for achieving the goals of treatment in this young population allowing preservation of the femoral head while minimizing rates of non-union and osteonecrosis.[16] Femoral neck shortening of more than 5 mm has been correlated with decreased functional outcomes and an increased incidence of requiring walking assistance. [17]

Anatomical reduction tried by closed reduction should be gentle and non-repetitive. Failed anatomical reduction is an indication for ORIF. Considering the femoral head blood supply anterior approaches are favoured as against posterior approaches. Currently Smith-Perterson, Heuter's and Watson Jones approaches are used to fix ICNF fractures. This new approach called "AP Access" can be added to this list with strong reasons.

The Smith-Peterson approach gives good exposure but as it is dead anterior it often requires cutting rectus femoris from its origin. Sometimes both direct and indirect heads are taken down for good exposure. Repair of rectus femoris is mandatory as it may have detrimental effects both on hip & knee function. Heuter's approach gives excellent visualisation of head and neck femur but lateral femoral cutaneous nerve, femoral nerve & ascending branches of lateral circumflex femoral arteries are at risk. Watson-Jones approach gives good visualisation of the basi-cervical and fair visualisation of trans-cervical but the sub-capital part remains poorly visible. It is also associated with post-operative limp due to intra-operative handling abductor mechanism and injury to superior gluteal nerve. TFL muscle is split and handled in "AP' Access" but no complaints suggestive of TFL dysfunction was observed. Pain while lying on the affected hip is the only complaint we noticed which resolved within 2-3 weeks. Though we have not encountered but possibilities of heterotopic ossification, myositis ossificans, abductor weakness or superior gluteal nerve traction can not be ruled out completely.

Supine position is useful for intra-operative manipulation of affected extremity like longitudinal traction, rotation, abduction & adduction. However, the contralateral extremity can obstruct the proper lateral view so, lifting the contralateral limb while taking lateral view is required. "AP's Access" is possible with traction table or without traction table. With traction table, we lose versatility of applying anteromedial buttress plate to neck femur specially in Pauwels type II & III type ICNF fractures, as figure four position of the affected extremity is not possible. (Table 2)

ICNF fracture which is still known as unsolved fracture because, despite the best possible treatment the complications like osteonecrosis, fixation failure and non-union are very frequent. Treatment of ICNF fractures has a mechanical base but the results are determined by biology. That's the reason ICNF fracture throws surprise and shows the results that are not expected. One such example is illustrated in figure 10. Even though fracture reduction appears reasonably good, the micro-instability at the fracture site leads to continuous tension in nourishing vessels of the femoral neck and ischaemic effect which in turn causes bone resorption. [18] Gross instability at the fracture site will not allow healing process to continue. Shear forces have the most detrimental effect on fracture healing hence anatomical reduction, absolute stability and compressive forces at fracture site provides the best environment for healing of ICNF fractures. If all this can be achieved through closed reduction then results will be on expected line. If anatomical reduction is not possible by closed means then ORIF should be considered.

In this study all the patients underwent ORIF with the aim of achieving anatomical reduction, absolute stability and compression at fracture site without losing neck length. The new approach called "AP's Access" through the TFL muscle fibers. avoids the needs of arterial search, ligation and also avoids nerve damage. It's a safe route with easy reproducibility, manoeuvrability, good exposure, and less complications.

Limitation of the Study

A small cohort of patients and single-centre study, no other comparative study

Conclusions

"AP's Access" is an anterior trans-muscular approach with a feasible modification of established approaches which addresses the apprehensions related with other anterior approaches and showing early promising results.

Potential Conflicts of Interest and Funding Sources:

There are no financial conflicts of interest to disclose

Declarations

Ethics Approval and Consent to Participate

The study was approved by the Ethical Review Boards of KIMS-KINGWAY Hospital. All methods were carried out in accordance with relevant guidelines and regulations stated in the Declaration of Helsinki.

Author Contributions

Dr Amol Patil: Conceptualization, Formal analysis, Investigation, Visualization, Writing – original draft.

Dr Sushrut Babhulkar: Conceptualization, Methodology, Formal analysis, Project administration

Dr Nitin Kimmatkar: Investigation, Writing – original draft. Supervision,

Dr Ashutosh Apte: Project administration, Supervision, Data curation

Dr Amol Kadu: Methodology, Formal analysis

Dr Aniruddha Sonegaonkar: Methodology, Formal analysis, Project administration

References

1. Weiguo Wang, Junjie Wei, Zhanwang Xu, Wenkun Zhuo, Yuan Zhang , Hui Rong, Xuecheng Cao, Pingshan Wang. Open reduction and closed reduction internal fixation in treatment of femoral neck fractures: a meta-analysis. BMC Musculoskeletal Disorders 2014, 15:167.

2. Kurtinaitis J, Dadonien' J, Kvederas G, Porvaneckas N, But'nas T: Mortality after femoral neck fractures: a two-year follow-up. Medicina (Kaunas) 2012, 48:145–149.

3. Schmidt AH, Swiontkowski MF: Femoral neck fractures. Orthop Clin North Am 2002, 33:97–111.

4. Patterson JT, Ishii K, Tornetta P, 3rd, Leighton RK, Friess DM, Jones CB, et al, (2021) Smith-Petersen Versus Watson-Jones Approach Does Not Affect Quality of Open Reduction of Femoral Neck Fracture. J Orthop Trauma 35, 517-522. https://doi.org/10.1097/bot.0000000000002068.

5. Jiang D, Zhan S, Cai Q, Hu H, Jia W (2021). Long-term differences in clinical prognosis between crossed- and parallel-cannulated screw fixation in vertical femoral neck fractures of non-geriatric patients. Injury 52, 3408-3414. https://doi.org/10.1016/j.injury.2021.07.014.

6. Collinge CA, Mir H, McAndrew C (2015) Displaced Femoral Neck Fracture in Young Adults: Accessory Fixation With Buttress Plating. Techniques in Orthopaedics 30, 16-21. https://doi.org/10.1097/bto.0000000000000131.

7. Open reduction and internal fixation (ORIF). In http://intermountainhealthcare. org/ext/Dcmnt?ncid=521402750.

8. Lichstein PM, Kleimeyer JP, Githens M, Vorhies JS, Gardner MJ, Bellino M, et al (2018) Does the Watson-Jones or Modified Smith-Petersen Approach Provide Superior Exposure for Femoral Neck Fracture Fixation? Clin Orthop Relat Res 476, 1468-1476. https://doi.org/10.1097/01.blo.0000533627.07650.bb

9. T. V. Ly and M. F. Swiontkowski, "Treatment of femoral neck fractures in young adults," Instructional Course Lectures, vol. 58, pp. 69–81, 2009.

10. T. Pauyo, J. Drager, A. Albers, and E. J. Harvey, "Management of femoral neck fractures in the young patient: a critical analysis review," World Journal of Orthopedics, vol. 5, no. 3,pp. 204–217, 2014.

11. D. S. Chan, "Femoral neck fractures in young patients: state of the art," Journal of Orthopaedic Trauma, vol. 33, no. 1, pp. S7–11, 2019.

12. F. Razik, A. S. Alexopoulos, B. El-Osta et al., "Time to internal fixation of femoral neck fractures in patients under sixty years—does this matter in the development of osteonecrosis of femoral head?," International Orthopaedics, vol. 36, no. 10, pp. 2127–2132, 2012.

13. R. I. Davidovitch, C. J. Jordan, K. A. Egol, and M. S. Vrahas,"Challenges in the treatment of femoral neck fractures in the non elderly adult," Journal of Trauma and Acute Care Surgery, vol. 68, no. 1, pp. 236–242, 2010.

14. M. Duffin and H. T. Pilson, "Technologies for young femoral neck fracture fixation," Journal of Orthopaedic Trauma, vol. 33, no. 1, pp. S20–S26, 2019.

15. Girard J, Glorion C, Bonnomet F, Fron D, Migaud H. Risk factors for revision of hip arthroplasties in patients younger than 30 years. Clin Orthop Relat Res 2011; 469: 1141-1147 [PMID: 21086195 DOI: 10.1007/s11999-010-1669-x]

16. Yang JJ, Lin LC, Chao KH, Chuang SY, Wu CC, Yeh TT, Lian YT. Risk factors for nonunion in patients with intracapsular femoral neck fractures treated with three cannulated screws placed in either a triangle or an inverted triangle configuration. J Bone Joint Surg Am 2013; 95: 61-69 [PMID: 23283374 DOI: 10.2106/jbjs.k.01081]

17. Zlowodzki M, Brink O, Switzer J, Wingerter S, Woodall J, Petrisor BA, Kregor PJ, Bruinsma DR, Bhandari M. The effect of shortening and varus collapse of the femoral neck on function after fixation of intracapsular fracture of the hip: a multi-centre cohort study. J Bone Joint Surg Br 2008; 90:1487-1494 [PMID: 18978271 DOI: 10.1302/0301-620X.90B11.20582]

18. Collinge CA, Mir H, McAndrew C (2015) Displaced Femoral Neck Fracture in Young Adults: Accessory Fixation With Buttress Plating. Techniques in Orthopaedics 30, 16-21. https://doi.org/10.1097/bto.0000000000000131