



Flawless Four in One Procedure for Obligatory and Recurrent Dislocation of Patella

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Pre and post of evaluation done with Kujala scoring and radiological assessment.

Discussion and Conclusion: Many bony and soft tissue factors contribute for the patellar dislocation. To avoid relapse and obtain excellent results, all the etiological factors need to be addressed especially in children as early as possible. Though many stabilization procedures are tried like MPFL reconstruction, it has its own drawbacks like stiffness, physeal damage with suboptimal results and high unsatisfactory results from 20 to 80%. In our technique relapse rate was nil and excellent outcome and high satisfactory results from children and parents with many advantages like no implants, no radiation hazards and near normal range of motion.**Keywords:** Patellofemoral; Tenodesis; MPFL; Physeal Damage; Trochlear Dysplasia**Introduction**

Patello femoral instability is a complex disorder for many decades but still one of the most debatable disorder due to various underlying etiologies and more than 100 stabilization procedures are available till date. More number of surgical procedures itself is a strong evidence that it's an unrefined area and many proce-

dures are still evolving. Patellofemoral instability is a wide spectrum of disorder presented with various symptoms from mild anterior knee pain to fixed unreduced patellar dislocation and many times the children are being presented with symptoms related with etiological factors like genu valgum, limited range of motion, gait abnormalities like rotational deformities, recurrent fall especially

during the initial days and later after the child grows the symptoms become severe like recurrent and fixed dislocation. Nonoperative measures like bracing, physical therapy are helpful only to some extent especially in first episode of dislocation but won't address the complex etiological factors.

Objectives

The purpose of this study is to share our experience in 4 IN 1) Q tube plasty 2) Lateral sagittal z plasty 3) Lateral hemitransfer of patellar tendon 4) tenodesis with semitendinosus) procedures for recurrent fixed and obligatory dislocation [1], which gives excellent results with nil relapse, near normal range of motion and return to regular sports activities.

Because of its complex nature of etiology and symptoms of patellar dislocations, many procedures are being evolved for many decades from just hamstring tenodesis to MPFL reconstruction but surgical intervention should be planned according to the pathology and executed like proximal and distal realignment procedures. But in Pediatrics age group it is very difficult to follow the parameters like insall index and TTG because of its wide range and it's difficult to exactly assess due to cartilaginous nature. Though MPFL reconstruction is the cornerstone for patella dislocation it's having its own disadvantages like growth arrest of distal femur, patella fracture and stiffness and other realignment procedures are having very high rate of relapse due to nonaddressal of the various etiological factors. Though MPFL reconstruction [2] is the mainstay of treatment it's having its disadvantages and it won't address the deforming forces the main cause for patellar dislocation.

In this study we evaluate the clinical, functional, radiological outcome of the four in one procedure in various type of Patella dislocation.

Materials and Methods

It's a retrospective study conducted at a rural hospital at kalakad, Tirunelveli district done by a single surgeon between February 2019 to august 2024. All were unilateral. 9 females and 3 males and 8 right and 4 left. 3 knees were previously operated for previous reasons. All 12 knees have trochlear dysplasia [3] of various grades according to dejour classification.

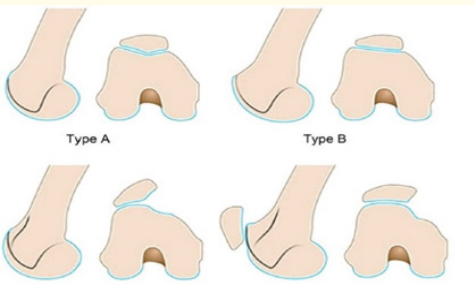


Figure 1: Trochlear dysplasia dejour classification.

Preop and post op assessment was done by Kujala scoring system. All dislocations were lateral type dislocated with first 20 to 30 degrees of flexion. All children were presented with anterior knee pain, frequent falls, extensor weakness and frank dislocation. All patella were small and hypermobile with no patella alta. 4 children were having hyperlaxity with Beighton score more than 5.

Variable	Score
Limp	
None	5
Slight or periodical	3
Constant	0
Support	
Full support without pain	5
Painful	3
Weight bearing impossible	0
Walking	
Unlimited	5
More than 2Km	3
1-2 Km	2
Unable	0
Stairs	
No difficulty	10
Slight pain when descending	8
Pain both when descending and ascending	5
Unable	0
Squatting	
No difficulty	10
Repeated squatting painful	4
Painful each time	3
Possible with partial weight bearing	2
Running	
No difficulty	10
Pain after more than 2 km	8
Slight pain from start	6
Severe pain	3
Unable	0
Jumping	
No difficulty	10
Slight difficulty	7
Constant pain	2
Unable	0
Prolonged sitting with the knees flexed	
No difficulty	10
Pain after exercise	8
Constant pain	6
Pain forces to extend knees temporarily	4
Unable	0
Pain	
None	10
Slight and occasional	8
Interferes with sleep	6
Occasionally severe	3
Constant and severe	0
Swelling	
None	10
After severe exertion	8
After daily activities	6
Every evening	4
Constant	0
Abnormal painful kneecap movement (subluxations)	
None	10
Occasionally in sports activities	6
Occasionally in daily activities	4
At least one documented dislocation	2
More than two dislocations	0
Atrophy of thigh	
None	5
Slight	3
Severe	0
Flexion deficiency	
None	5
Slight	3
Severe	0

Total score: 95-100, excellent; 80-94, good; 60-79, fair; 0-60, poor.

Figure 2: Kujala score.

Demographics		
Age	7 to 14 yrs mean 8.8	7 yrs 1 8 yrs 1 9 yrs 3 10 yrs 2 11 yrs 2 12 yrs 1 14 yrs 2
Sex	F:9 M:3	No 12
Side	Rt 8 Lt 4	No 12
Previous operated cases	Yes - 3 No: 9	No 12
Ligament laxity	Yes: 4 (Beigton score >5) No: 8	No 12
Kujala score	Preop: Excellent - 0 Good - 1 Far - 6 Poor - 5	No 12
	Postop: Excellent - 6 Good - 1 Far - 1	No 12

Figure 3

All the patients were evaluated clinically and radiologically. Physically they were assessed in sitting, standing and walking and all risk factors were evaluated like genu valgum, hyper laxity, rotational abnormality like hip rotation, patellar apprehension, patellar tilt, range of motion and ACL were assessed. X-ray both knees AP, lateral, skyline and merchant views were taken. CT and MRI's were taken in specially indicated patients like first time dislocation and gross rotational abnormalities.

Risk factors	Points
Age (years)	
>16	0
≤16	1
Bilateral instability	
No	0
Yes	1
Trochlear dysplasia	
None	0
Mild	1
Severe	2
Patellar height	
≤1.2	0
>1.2	1
TT-TG (mm)	
<16	0
≥16	1
Patellar tilt (°)	
≤20	0
>20	1
Total points	7

Figure 4

Inclusion criteria

- 6 to 14 years
- Good skin condition even if previously operated
- All types of Patella dislocation

Exclusion criteria

- Rotational abnormalities
- More than 14 years
- Neuromuscular disorders
- Lost follow for more than one year
- First episode of Patella dislocation.

Surgical technique

Single surgeon under regional anesthesia with regional nerve block. Preoperative third generation Cephalosporin was given. Bump was kept under the buttock and tourniquet was applied. Straight anterior midline incision and the second incision was used in two cases. Thick flap was raised specially in previously operated cases and all the adherent layers were released. 1) The lateral arthrotomy was done in a meticulous way as such 1st and 2nd layers to be divided carefully and vastus lateralis was detached with a cuff of tissue to suture back, 2) Medial para patellar arthrotomy was done with vastus medialis to be positioned to cross the Patella and quadriceps expansion was denuded from the medial aspect of the Patella 3) Semi tendinosis was stripped from the musculotendinous junction and distal insertion was left intact and in one case due to preoperative scarring the quality of semitendinosus was not good and strip of quadriceps was used for tenodesis The tenodesis can be done by drilling through the patella from inferomedial to superolateral or can be stitched over the anterior periosteum and soft tissue of the Patella. The tendon tension can be adjusted according to patella tracking over the trochlea. At 30° of flexion vastus medialis pulled and sutured to the free edge of the vastus lateralis and made the tube quadriceps plasty. Lateral release was sutured with alternative first and second layer of lateral retinaculum depends upon the tracking. 4) Final step will be detaching the lateral of the Patellar tendon from the insertion and brought behind the medial half of the Patellar tendon and sutured over the periosteum with 2 ethibond.

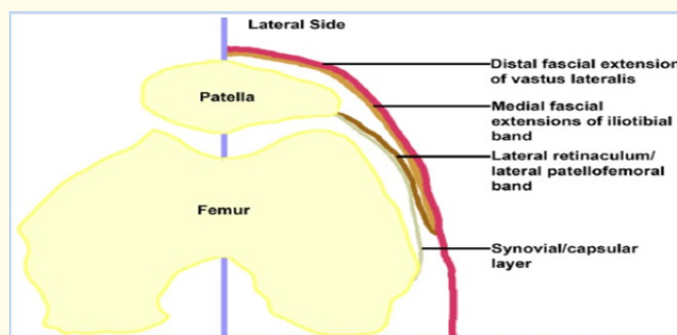


Figure 5

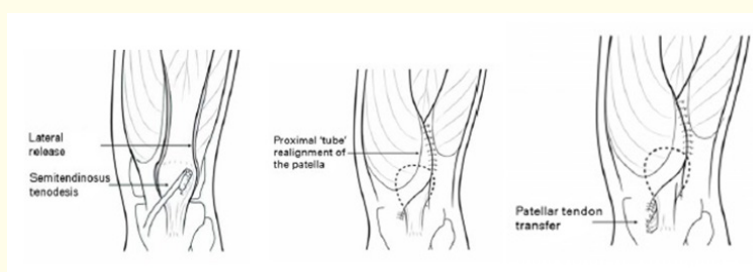
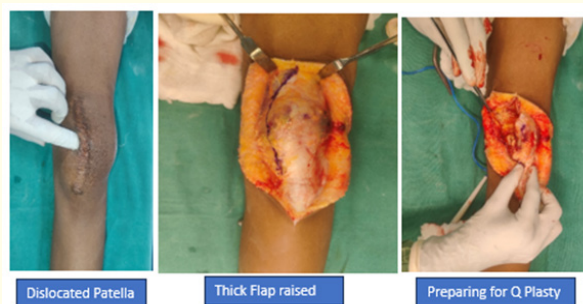


Figure 6

Patellar tracking should be assessed at the end of each step of the procedure. Drain was kept and wound closed in layers. Postoperatively long leg cast was applied with knee flexion in 15 to 20° for three to four weeks which can be converted to long leg brace

for 3 more weeks. Aggressive isotonic quadriceps exercise was encouraged from the first day of surgery. Touch toe walking can be encouraged at the end of second week. Mean surgical duration was 75 minutes (65 mins to 115 mins).



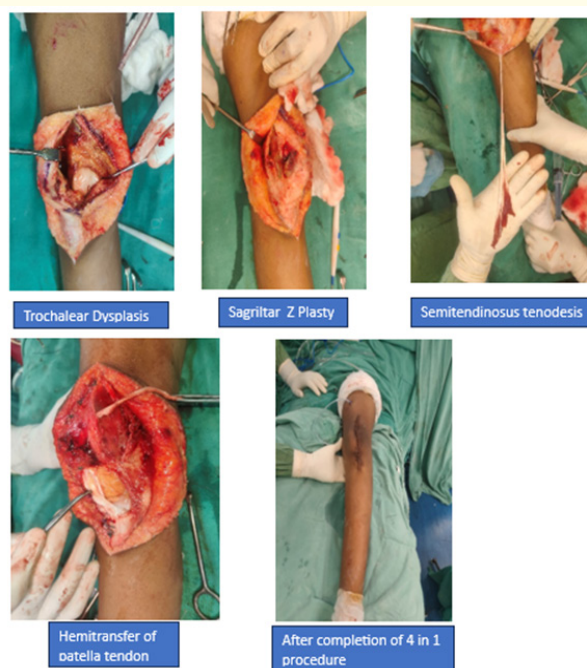


Figure 7

Results

It was assessed by clinically by Kujala score and radiologically. Post operative assessment was excellent in six cases, good in five cases, poor in one case due to non adherence to physical therapy. Radiologically trochlear regrowth and sulcus angle were assessed.

X-ray was taken every six months to assess the radiological parameters. Mean follow up of 26 months (13 months to 48 months) 6 cases of the trochlear dysplasia of type D became A to B within two years of surgery and no recurrent dislocation in all the cases.



Figure 8: Trochlea remodelled in 3 years.

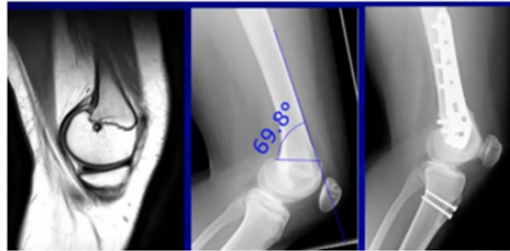
Complications

No infections, one case had five degree of extensor lag because of the previous surgery and one case had decrease range of motion that is 0 to 100° due to non adherent to the physiotherapy.

Discussion

Patellofemoral instability is a wide spectrum of disorder with debatable etiological factors with different presentations like anterior knee pain, recurrent fall, abnormal gait, rotational abnormalities and patellar dislocation many predisposing factors are

like MPFL reconstruction [4,5] which is the cornerstone but MPFL reconstruction poses technical challenges in skeletally immature patients [6] due to close proximity of ideal graft fixation point to the physis of the distal femur (Schottle point that is 3.7 to 10 M close to the Physis).



Courtesy: Gerd seitlinger.

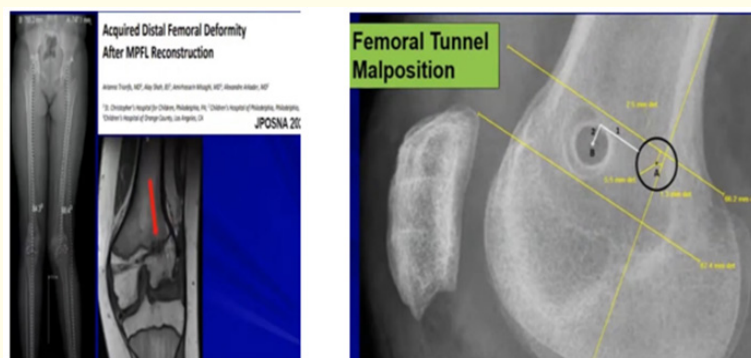


Figure 10

of relapse due to non addressal of the etiological factors. Forden at all recommended the modified Roux Goldthwait technique with increased Q angle and Marsh et al has done as an additional procedure to lateral release.

Many cases have been reported with complications of MPFL reconstruction like growth arrest, knee stiffness, subsequent injury Patella fracture and relapse of Patella dislocation. More than above MPFL reconstruction won't address the culprit of the recurrent dislocation of Patella like contralateral lateral structure, weak medial structure.

In our 4 in 1 procedure, we address all the pathology in recurrent dislocation of Patella like increased Q angle, balance in the soft tissues. Our procedure is a a la cart procedure, could be easily modified perioperatively according to the perioperative findings like Patella tracking and range of motion. Still most unanswerable question is when to intervene and the answer would be as early as possible because we have to use the plasticity nature of the children and if you keep the Patella in a trochlear groove, the trochlea will remodel [8] wonderfully as we are seeing in the DDH and obstetric brachial palsy shoulders. In all our patients, all were having

full range of motion with good Patella tracking with no recurrent dislocation in our follow up period. We had two complication 1 decreased range of motion due to noncompliance to physical therapy and another boy had five degree of extensor lag due to previous surgery for suspected septic arthritis. Limitations of our study is a small group, long term follow up even after skeletal maturity is needed and we don't have a comparative study between the surgical and non surgical and then many parameters like TT:TG ratio could not be compared pre and postoperatively due to cartilaginous structure [9] and wide range of reference value.

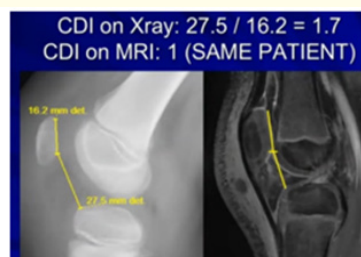


Figure 11

Conclusion

Patellar dislocation either recurrent or obligatory is still a debatable disorder with many contributing and predisposing factors. To get excellent results and functional outcome, the etiological factors to be addressed and patellar tracking should be maintained in the trochlea with full range of motion till it gets remodelled [10].

In our retrospective study all the criteria's have been fulfilled to get excellent outcome and good satisfaction from parents and the children with no recurrent dislocation. The unique advantages of this procedure is that it is a a la cart in nature, tension can be adjusted, with no radiation exposure, no implants with almost nil complications.

Though many individual and combined soft tissue and Bony procedures are evolved, this 4 in 1 procedure will hold its place for many decades.

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