# The Utility of Examination under Anesthesia as a Diagnostic Test for Patellar Instability

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# JUPITER Participating Sites & Surgeons

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| Daniel Green | Hospital for Special Surgery |
| Peter Fabricant | Hospital for Special Surgery |
| Sabrina Strickland | Hospital for Special Surgery |
| Shital Parikh | Cincinnati Children's |
| Eric Wall | Cincinnati Children's |
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| Jason Koh | Northshore |
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| Marc Tompkins | TRIA |
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| Henry Ellis | Texas Scottish Rite |
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The Ohio State University · OHSU · Boston Children's Hospital (Until every child is well) · HSS · ORTHOINDY (Bone · Joint · Spine · Muscle) · RUSH · Texas Scottish Rite Hospital for Children (www.tsrhc.org)

Columbia University Irving Medical Center · Stanford Medicine · NorthShore University HealthSystem · TRIA · Cincinnati Children's

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# Introduction

- Examination under anesthesia (EUA) is considered a valuable tool that can aid in clinical diagnosis of joint instability and has been reported for knee instability, shoulder instability and elbow instability. However, the utility of EUA for evaluation of patellar instability has not been reported.

- Many consider the ability to dislocate the patella under anesthesia a confirmatory test to establish a diagnosis of patellar instability. Some consider it as a prerequisite for surgical stabilization

- The goal of this study was to evaluate the utility of examination under anesthesia (EUA) as a diagnostic tool for assessing patellar instability.

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# Methods

- 2074 knees were prospectively enrolled in the JUPITER (Justifying Patellar Instability Treatment by Results) multi-center study from 2017-2021.

- Patellar instability was defined as:
  - a dislocated patella requiring reduction in ED or
  - a convincing history for dislocation, associated with full giving way, and following physical findings:
    - (a) hemarthrosis / effusion,
    - (b) tenderness along medial retinaculum, and
    - (c) positive apprehension test or
  - MRI-documented dislocation with characteristic bone bruises.

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# Methods

- Patients treated conservative (507), those with bilateral instability (420), those with previous surgery on ipsilateral knee (187), and those lacking sufficient data (233) were excluded from analysis.
- 478 patients formed the final cohort of patients treated surgically for unilateral patellar instability
- Demographics
  - Mean age: 15.8 years (+/- 3.81)
  - Sex: 287 females (59.9%) / 191 males (39.1%)
  - Laterality: 268 left (56.1%) / 210 right (43.9%)
  - BMI: 24.4

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# Methods

- 137 First time dislocators had surgical treatment at mean 3.9 months post instability event.
- 340 Recurrent dislocators had surgical treatment at mean 38.2 months after their first dislocation.
- Prior to surgery and with patient under anesthesia, the patella was manually pushed laterally with submaximal force with the knee at 0° and 30°
- EUA was performed for the affected knee and the contralateral knees (control knee) to check if patella could be dislocated (positive EUA) or not (negative EUA)

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# Results

| Knee at 0° | | | | |
|---|---|---|---|---|
| | | | | |
| | Involved Knees | Contralateral Knees | Total | |
| | | | | |
| Positive EUA | 245 | 25 | 270 | 90.7% PPV |
| Negative EUA | 214 | 347 | 561 | 61.9% NPV |
| Total | 459 | 372 | | |
| | 53.4% Sensitivity | 93.3% Specificity | | |
| | | | | |
| **Knee at 30˚ flexion** | | | | |
| | | | | |
| | Involved Knees | Contralateral Knees | Total | |
| Positive EUA | 173 | 14 | 187 | 92.5% PPV |
| Negative EUA | 285 | 361 | 646 | 55.9% NPV |
| Total | 458 | 375 | | |
| | 37.8% Sensitivity | 96.3% Specificity | | |

PPV: Positive Predictive Value, NPV: Negative Predictive Value

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# Results

- At 0° (Knee in extension)
  - Sensitivity and Specificity of EUA to diagnose patellar dislocation was 53.4% and 93.3% respectively
  - The positive and negative predictive values were 90.7% and 61.9% respectively

- At 30° Knee flexion
  - Sensitivity and Specificity of EUA to diagnose patellar dislocation was 37.8% and 96.3% respectively
  - The positive and negative predictive values were 92.5% and 55.9% respectively

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# Results

- EUA at 0˚
- Patients with positive EUA at 0˚ were significantly older (p = 0.0312) and a higher percentage of them were females (p=0.0021)
- more patients with positive EUA had five or greater number of patellar dislocations (p = 0.0199)
- those with positive EUA had a higher percentage of severe J-sign (p = 0.0018) and a higher Beighton score (p=0.007)
- There was no difference in BMI between the two groups

- EUA at 30˚
- Significant differences were observed in patient age (p = 0.0033), number of dislocations (p = 0.0011), presence of a J-sign (p = 0.0004) and Beighton Score (p = 0.038)
- Though more females had positive EUA, the difference was not significant

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# Discussion / Conclusion

- For all knees with confirmed patellar dislocation, only 53.4% were able to be dislocated during EUA with knee in extension and 37.8% with the knee at 30° flexion.
- Due to low sensitivity, a negative EUA should not preclude the diagnosis of patellar instability or surgical treatment
- Due to high specificity, a positive EUA can confirm patellar instability
- Anatomic risk factors may play a role in the ability to dislocate patella during EUA but were not evaluated in this study.

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# Thank you

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