**Table 1.** Reporting Checklist for the Delphi Technique

|  |  |
| --- | --- |
| **Checklist Item** | **Description** |
| 1. Research Problem
 | Pre-, intra-, and postoperative management following hip arthroscopy for Femoroacetabular Impingement Syndrome (FAI) |
| 1. Research Rationale
 | Standardize treatment at a national level using evidence-based guidelines and group consensus where published literature is currently lacking |
| 1. Literature Review
 | Peer-reviewed systematic review and meta-analysis of published literature, including 31 studies with 1,981 hips in 1,911 patients (accepted by AJSM) |
| 1. Methodology
 | * Data collection: blinded collection utilizing the Qualtrics platform and Poll Everywhere to guarantee anonymity during voting
* Rounds: survey of current practices followed by 3 Delphi rounds
* Sample: 15 hip arthroscopists, selection criteria outlined under consensus participants
* Reliability/Validity: Lincoln and Guba criteria applied
* Result interpretation: guidelines for consensus reported in methods
 |
| 1. Data Analysis
 | * Response rate: 100% in each round
* Results: reported for each round, including level of agreement
 |
| 1. Discussion/Conclusion
 | * Areas with lack of consensus clearly outlined
* Interpretation of consensus items created in checklist
* Direction of future research provided
 |
| 1. Appendix Items
 | Copy of each round illustrated |

**Table 2.** Scope of Consensus and Survey of Current Practices

|  |
| --- |
| **Scope of Consensus and Current Practices** |
| 1. What do you believe should be the scope of this best practice statement on hip arthroscopy in femoroacetabular impingement (preoperative management and identification of ideal patients for arthroscopic management, intraoperative practices, postoperative management)?
 |
| 1. Do you utilize hip arthroscopy rather than mini-open/surgical dislocation as the standard of care for surgical management of FAI, unless specific contraindications exist?
 |
| 1. Does every member of your department utilize a shared standard for conservative care trials prior to surgical management in FAI?
 |
| 1. Does every member of your department utilize a shared standard for surgical management of FAI?
 |
| 1. During hip arthroscopy in patients with labral tears, do you perform an intraoperative labral repair rather than debridement only?
 |
| 1. In the setting of a patient with ligamentous laxity, do you perform capsular plication?
 |
| 1. How do you determine the amount of bone resection required intraoperatively?
 |
| 1. What duration of conservative care treatment do you permit prior to conversion to surgical arthroscopic management?
 |
| 1. How do you assess improvement or responsiveness to conservative treatment (clinical, radiographic, etc.)?
 |
| 1. Which of the following patient reported outcomes do you collect? (IHOT-12, IHOT-33, HOOS, HHS, mHHS, NAHS, HOS ADL, HOS Sports Scale, SF-12, WOMAC, other)
 |
| 1. Which patient reported outcomes influence your surgical decision making?
 |
| 1. Do you recommend postoperative rehabilitation to your patients following arthroscopic management of FAI?
 |
| 1. Do you recommend postoperative hip bracing to patients following arthroscopic management of FAI?
 |
| 1. What patient characteristics increase or decrease the likelihood of recommending surgical management of FAI?
 |
| 1. What patient history variables increase or decrease the likelihood of recommending surgical management of FAI?
 |
| 1. What joint parameters increase or decrease your likelihood or recommending surgical management of FAI?
 |
| 1. What alpha angle do you consider high enough to suggest early surgery?
 |
| 1. If you are performing a staged procedure, what is the minimum number of weeks that you allow between both procedures?
 |
| 1. How long do you recommend patients complete physical therapy postoperatively?
 |
| 1. What lateral center-edge angle threshold should prompt surgery before failed time of rehab?
 |
| 1. If you prescribe postoperative bracing, what is your current protocol?
 |
| 1. If you prescribe postoperative crutches, what is your current protocol?
 |
| 1. Do you recommend Continuous Passive Motion (CPM) machine postoperatively?
 |
| 1. What is your protocol for weight-bearing and return to play postoperatively?
 |

**Table 3.** Round 1

|  |
| --- |
| **Initial Intervention Recommendations** |
| 1. Preoperative care should include patient education regarding FAI
 |
| 1. A minimum of 3 months of conservative care treatment should be used as the standard duration for conservative treatment.
 |
| 1. Preoperative conservative care should include which the following\*:

|  |  |  |
| --- | --- | --- |
| * Trial of rest
 | * Trial of NSAIDs
 | * Intra-articular injections
 |
| * Trial of activity modification
 | * Physical Therapy
 | * NOT include opioids
 |

 |
| 1. Which of the following patient characteristics should make you less likely to require the full duration of conservative treatment? \*

|  |  |  |  |
| --- | --- | --- | --- |
| * Young age
 | * Worker’s compensation claim
 | * Refusal of PT due to pain
 | * Anterior, Posterior, or Lateral Pain
 |
| * Professional athlete
 | * No worker’s compensation claim
 | * Inability to work
 | * 0-49% improvement (marginal) following IA inj.
 |
| * Nonprofessional athlete
 | * Long Duration of Symptoms
 | * Concomitant Athletic Pubalgia
 |
| * In-season athlete
* Out-of-season athlete
 | * Partial vs. full completion of PT with marginal improvement
 | * Pain with torsional activities or prolonged sitting
 | * 50-100% improvement (substantial) following IA inj.
 |

 |
| 1. Which of the following joint parameters would allow you to consider proceeding with surgery prior to completion of the full duration of conservative treatment\*?

|  |  |  |  |
| --- | --- | --- | --- |
| * High alpha angle
* Low Tonnis grade
 | * Combined Impingement
* Femoral retroversion
 | * Os Acetabuli
* Large ROM limitations with pain
 | * Large pincer-type deformity in the absence of OA changes
 |
| * Cam Impingement
* Prominent AIIS
 | * High vs low baselines mental health score as indicated by a high VR-12
 | * Large cam-type deformity in the absence of OA changes
 | * Large combined deformity in the absence of OA changes
 |

 |
| 1. Which of the following should be contraindications to arthroscopic management of FAI\*:

|  |  |  |  |
| --- | --- | --- | --- |
| * C-E Angle<20
 | * High MRI chondral grade
 | * Severe limitation with ADLs
 | * Obesity affecting access
 |
| * Global Pincer Dysplasia/FAI
 | * Tonnis grade 2 or higher
 | * Using a cane or crutches
 | * Inseam>36” affecting access
 |
| * Dysplasia with instability
 | * Posterior cam lesion involving retinacular vessels
 | * Severe femoral retroversion or anteversion with gait abnormality
 | * FHEI >25%
 |
| * Joint space narrowing or OA
 | * Broken Shenton’s Line
 |

 |
| 1. During hip arthroscopy in patients with labral tears, intraoperative labral repair rather than debridement should be performed
 |
| 1. When addressing cam lesions, bone resection should be guided by the following\*:

|  |  |  |
| --- | --- | --- |
| * Plain preoperative radiograph
 | * Resection to the subcortical bone
 | * Dynamic exam looking for impingement areas
 |
| * Preoperative 3D CT scans
 | * Re-establishing femoral head/neck slope
 | * Fluoroscopy
 |

 |
| 1. In the setting of ligamentous laxity (Beighton Score ≥5 or diagnosis of Ehlers-Danlos Syndrome), capsular plication should be performed.
 |
| 1. In the setting of borderline dysplasia, capsular plication should be performed during hip arthroscopy.
 |
| 1. In the setting of increased femoral version, capsular plication should be performed during hip arthroscopy.
 |
| 1. Postoperative rehabilitation should be recommended to all patients following arthroscopic management of FAI.
 |
| 1. Postoperative hip bracing should be recommended to patients: with revision with adhesions / undergoing labral repairs and/or capsular plication
 |
| 1. Continuous Passive Motion (CPM) machine should be recommended to:
	1. all patients following arthroscopic management of FAI
	2. patients with laxity or Ehlers-Danlos Syndrome
	3. patients with revisions with adhesions
 |

***\**** *Presented in a matrix table*

**Table 4.** Round 2 (Revisions to Select Interventions and New Additions)

|  |
| --- |
| **Delphi Round 2 (Including Revised Statements)** |
| 1. Which of the following patient characteristics should make you less likely to require the full duration of conservative care? †

|  |  |  |
| --- | --- | --- |
| * Successful surgery on the contralateral side
 | * Mechanical symptoms of catching
 |  |
| * Mechanical symptoms of locking
 | * Sharp stabbing pain
 |  |

 |
| 1. The following alpha angle should be considered high enough to encourage surgery before failed time of rehab†: 55°/60°/65°
 |
| 1. The following are contraindications to arthroscopic management of FAI:

|  |  |  |
| --- | --- | --- |
| * Pain out of proportion with the underlying recognized psychosocial issues
 | * Lateral C-E angle <20
* Failed arthroscopy with dysplastic features
 | * Joint space <2mm anywhere along the sourcil
* Patient <15 years of age or skeletally immature
 |
| * Pain that does not localize well to the hip on exam
 | * Hypermobility with dysplastic features
 | * Outerbridge grade III or IV
 |
| * Inclination Tonnis angle >13-15 degrees
 |  |  |

 |
| 1. An MRI should be obtained†: When a patient presents with first time hip pain consistent with a labral tear / In the setting of a previous hip scope with intra-articular pain /Arthrogram should be obtained in the revision setting
 |
| 1. The following are indications for concomitant or simultaneous procedures in patients with bilateral FAI (as opposed to a staged approach)†:

|  |  |  |
| --- | --- | --- |
| * Any patient with a need to return to work or activity that limits available time for rehab
 | * Absence of any upper extremity problems
* Lack of significant bilateral symptoms
 | * Professional or scholarship level athlete with time restrictions for recovery
 |
| * Young patient (<30 years)
 | * Significant bilateral symptoms
 |  |

 |
| 1. When performing a staged procedure, the following should be the minimum standard duration between procedures†:4 weeks/6 weeks/8 weeks
 |
| 1. In patients with combined pathology, which of the following is most important to address†: Femoral pathology/Acetabular pathology/Both
 |
| 1. *Although postop rehabilitation protocols should be customized to the patient’s needs, 3 months* should be the standard minimum duration
 |
| 1. Preoperative rehabilitation protocols should include the following 4 phases, or a variation thereof: (1) maximum protection and mobility, controlled stability, strengthening, and return to sport.
 |
| 1. A preoperative physical therapy session (prehab) should be recommended when the patient will be prescribed postop rehabilitation
 |
| 1. In patients with *laxity or Ehlers-Danlos syndrome*, postoperative bracing should be completed for a minimum duration of: 2 weeks/3 weeks†
 |
| 1. When you prescribe postoperative bracing, the following should be recommended†:

|  |  |  |
| --- | --- | --- |
| * Abduction brace set a 10 abduction with flexion extension 0-90
 | * Bracing should be removed during rehabilitation activities
 | * Bracing should be removed during driving
* Bracing should be removed during showering
 |
| * No abduction, 0-90 flexion
 | * Abduction pillow during sleep
 | * Bracing should be removed during sleep
 |

 |
| 1. Patients should not be *non-weight bearing at any time* postoperatively†
 |
| 1. Foot-flat weight-bearing should occur at *0-1 weeks* postoperatively†
 |
| 1. Full weight bearing should occur at *2-3 weeks* postoperatively†
 |
| 1. CPM machine should be *considered* in patients with revisions with adhesions\*
 |
| 1. 4 months should *generally* be the minimum standard duration for return to full activity or competitive sports\*
 |
| 1. What are your indications for labral reconstruction (use of a graft), if any, rather than a labral repair (repair of torn tissue)?
 |

† New Additions

\* *Revisions* are shown in italics

**Table 5.** Round 3 (Final Revised Items and New Additions)

|  |
| --- |
| **Live Delphi Meeting** |
| 1. *Hypermobility (Beighton Hypermobility Score ≥5)* is *a contraindication* to arthroscopic management of FAI\*
 |
| 1. *Hypermobility (Beighton Hypermobility Score ≥5)* *with dysplastic features* is *a contraindication to* arthroscopic management of FAI\*
 |
| 1. Skeletal immaturity or a patient <15 years of age is *not a contraindication* to arthroscopic management*\**
 |
| 1. A large cam-type deformity is defined by an alpha angle >65 degrees†
 |
| 1. Surgery for bilateral FAI should generally be completed via a staged approach†
 |
| 1. The following are *not indications* for *concomitant or simultaneous procedures* in patients with bilateral FAI: nonprofessional athlete *or* young patient\*
 |
| 1. Intraop bone resection should include any hard, sclerotic cam bone†
 |
| 1. Labral reconstruction, rather than repair, should be done in a revision surgery with a labral deficiency†
 |
| 1. Labral reconstruction, rather than repair, should be done in a patient with an irreparable labral tear†
 |
| 1. Acetaminophen/Hydrocodone can be prescribed for 1-2 tables q4-6 hours for the first 2-3 days†
 |
| 1. Afterwards, Acetaminophen/Hydrocodone should be discontinued and patients should be transitioned to Acetaminophen PRN†
 |
| 1. In patients with *Ehlers-Danlos syndrome*, postoperative bracing should be completed for a minimum duration of 3 weeks\*
 |
| 1. In patients with *laxity*, postoperative bracing should be completed for a minimum duration of 3 weeks\*
 |
| 1. The following should be recommended in postoperative bracing: abduction brace set at 10° abduction with flexion-extension 0-90, *with adjustments based on the surgeon's judgment\**
 |
| 1. *In postoperative bracing*, an abduction pillow during sleep *is not recommended*\*
 |
| 1. Aspirin 325 mg should be used for DVT/VTE prophylaxis rather than LMWH, unless specific contraindications exist†
 |
| 1. DVT/VTE prophylaxis with should begin the night of surgery and continue for 4 weeks†
 |

*† New Additions*

*\* Revisions are shown in italics*

**Table 6.** Recommendations Reaching Consensus

|  |  |  |  |
| --- | --- | --- | --- |
| **Consensus on Interventions** | **Total** | **Strongly Agree** | **Agree** |
| ***Preoperative*** |  |  |  |
| 1. Patients should receive education regarding FAI†
 | 100 | 80 | 20 |
| 1. Conservative treatment should include a standard min duration of 3 months, including:
 | 94 | 27 | 67 |
| 1. Trial of rest\*
 | 80 | 33 | 47 |
| 1. Trial of NSAIDs\*
 | 100 | 47 | 53 |
| 1. Activity modification or restriction\*
 | 93 | 20 | 73 |
| 1. Physical therapy\*
 | 87 | 27 | 60 |
| 1. No opioids\*
 | 100 | 73 | 27 |
| 1. Permit less than the full duration of conservative treatment with the following clinical history:
 |  |  |  |
| 1. Professional athletes or out-of-season athletes\*
 | 80 | 27 | 53 |
| 1. Patients who are undergoing PT with no or marginal improvement as deemed by the surgeon and physical therapist
 | 87 | 27 | 60 |
| 1. High baseline mental health (per the VR-12 questionnaire)\*
 | 80 | 7 | 73 |
| 1. Successful surgery on the contralateral side†
 | 87 | 40 | 47 |
| 1. Assess joint parameters for proceeding with surgery before completing the full duration of conservative tx:
 |  |  |  |
| 1. High Alpha angle\*
 | 100 | 60 | 40 |
| 1. Low Tonnis grade\*
 | 100 | 20 | 80 |
| 1. Large cam-type deformity in the absence of osteoarthritic changes\*
 | 100 | 40 | 60 |
| 1. Large combined deformity in the absence of osteoarthritic changes\*
 | 86 | 33 | 53 |
| 1. Large ROM limitations with pain†
 | 94 | 27 | 67 |
| 1. Obtain an MRI in the setting of a previous hip scope with intra-articular pain†
 | 80 | 33 | 47 |
| ***Intraoperative*** |  |  |  |
| 1. Perform hip arthroscopy\* unless the following contraindications exist:
 |  |  |  |
| 1. Joint space narrowing (<2 mm anywhere along the lateral and/or middle sourcil) or OA\*
 | 80 | 73 | 7 |
| 1. Tonnis grade ≥2\*
 | 87 | 27 | 60 |
| 1. Severe femoral retro or anteversion with gait abnormality\*
 | 87 | 47 | 40 |
| 1. Pain not localizing to the hip†, or out of proportion due to psychosocial issue†
 | 80 | 20 | 60 |
| 1. Obesity to where access cannot be obtained\*
 | 87 | 40 | 47 |
| 1. Broken Shenton’s line\*
 | 100 | 40 | 60 |
| \* Hypermobility (Beighton hypermobility score ≥5) and [skeletal immaturity] are **not** contraindications†  | 100 | 53[87] | 47[13] |
| 1. Guide bone resection by:
 |  |  |  |
| 1. Plain preoperative radiographs\*
 | 94 | 47 | 47 |
| 1. Visualization of the femoral head-neck contour & re-establishing the slope/junction\*
 | 100 | 87 | 13 |
| 1. Conducting a dynamic exam assessing areas of impingement\*
 | 93 | 60 | 33 |
| 1. Intraoperative fluoroscopy†
 | 86 | 73 | 13 |
| 1. Including any hard, sclerotic bone†
 | 100 | 13 | 87 |
| 1. In patients with labral tears, perform a labral repair, rather than debridement only\*
 | 100 | 73 | 27 |
| 1. Labral reconstruction (vs. repair) should be done in a revision surgery with a labral deficiency†
 | 85 | 0 | 85 |
| 1. Surgery for bilateral FAI should generally be completed via a staged approach†
 | 100 | 13 | 87 |
| * 1. A nonprofessional athlete or young patient is **not** an indication for a concomitant procedure†
 | 80 | 33 | 47 |
| 1. Perform capsular plication in ligamentous laxity (Beighton Score ≥5, Ehlers–Danlos)\*
 | 80 | 47 | 33 |
| 1. Perform capsular plication during hip arthroscopy in the setting of a patient with borderline dysplasia\*
 | 80 | 40 | 40 |
| 1. Address both femoral and acetabular pathology in combined lesions†
 | 94 | 67 | 27 |
| ***Postoperative*** |  |  |  |
| 1. Do not recommend non-weight bearing at any time post-op†
 | 87 | 40 | 47 |
| 1. Foot-flat weight bearing should be recommended immediately postop to week 1†
 | 94 | 47 | 47 |
| 1. Acetaminophen/Hydrocodone can be prescribed for 1-2 tables q4-6 hours for the first 2-3 days†
 | 86 | 13 | 73 |
| 1. Recommend postoperative rehabilitation to ALL patients following arthroscopy\*
 | 100 | 87 | 13 |
| 1. Postoperative rehabilitation should include a standard minimum duration of 3 months†
 | 87 | 27 | 60 |
| 1. Include the following rehab phases, or a variation thereof: (1) maximum protection and mobility, (2) controlled stability, (3) strengthening, and (4) return to sports†
 | 100 | 40 | 60 |
| 1. Recommend hip bracing to patients with Ehlers-Danlos syndrome for a minimum of 3 weeks†
 | 80 | 13 | 67 |
| 1. Bracing should be removed during rehab activities†
 | 87 | 27 | 60 |
| 1. Bracing should be removed during showering†
 | 87 | 40 | 47 |
| 1. In postop bracing, recommend abduction brace at 10° abduction with flexion-extension 0-90†
 | 93 | 13 | 80 |
| * 1. In postop bracing, an abduction pillow during sleep is not recommended†
 | 80 | 7 | 73 |
| 1. Recommend crutches to patients undergoing labral repairs and/or capsular plication\*
 | 100 | 67 | 33 |
| 1. Permit return to full activity or competitive sports at a minimum of 4 months postop\*
 | 94 | 47 | 47 |

**\*** These interventions reached consensus after the first round of voting

† These interventions reached consensus during subsequent Delphi rounds