Surgical Treatment and Complications of Lateral Extra-articular Procedures in the Anterior Cruciate Ligament–Reconstructed Knee: Part II of an International Consensus Statement

Bertrand Sonnery-Cottet, M.D., Ph.D., Alessandro Carrozzo, M.D., Adnan Saithna, M.D., Edoardo Monaco, M.D., Ph.D., Thais Dutra Vieira, M.D., Volker Musahl, M.D., Alan Getgood, M.D., Camilo Partezani Helito, M.D., Ph.D., and The International Experts Panel

Purpose: To establish international expert consensus on surgical techniques, complications, and rehabilitation protocols for lateral extra-articular procedures (LEAPs) performed adjunctively with anterior cruciate ligament reconstruction. **Methods:** Fifty-five knee surgeons from 17 countries on 5 continents completed a 3-round modified Delphi process. In the final round, 16 statements on LEAP techniques and complications were scored on a 5-point Likert scale; ≥75% "agree/strongly agree" constituted consensus. When appropriate, strength of recommendation was graded. Statements lacking support were revised until consensus or abandonment. **Results:** Six statements achieved unanimous consensus (100%), 2 had strong consensus (90%-99.9%), and 3 reached consensus (75%-89.9%); 4 were removed. Key technical recommendations were as follows: (1) in iliotibial band procedures, the graft strip should pass beneath the lateral collateral ligament; (2) an anatomic technique is mandatory for anterolateral ligament reconstruction; and (3) no single LEAP is clinically superior to another. Unanimous agreement indicated that modern LEAPs do not increase lateral compartment osteoarthritis risk, carry a low complication rate, and do not necessitate changes to rehabilitation or return-to-play timelines. **Conclusions:** Consensus defined core surgical principles and confirmed the safety of adding LEAPs to anterior cruciate ligament reconstruction. When an iliotibial band graft is used, it should be routed deep to the lateral collateral ligament and fixed between 0° and 60° of knee flexion under low tension. For anterolateral ligament reconstruction, femoral fixation should be in full extension at a posterior-proximal point relative to the lateral epicondyle. Although no single LEAP proved superiority, adherence to these principles permits safe, effective surgery without altering standard rehabilitation or return-to-sport protocols and without increasing osteoarthritis risk. **Level of Evidence:** Level V, expert opinion.

In the 1970s and 1980s, surgeons began to develop surgical techniques to address rotational instability in anterior cruciate ligament (ACL)–deficient knees by adding on extra-articular tenodesis (LET).[1,2] Surgeons introduced various techniques to address this rotational instability of the knee and to mitigate the pivot-shift phenomenon, mainly using a strip of iliotibial band.[3-6] However, enthusiasm for LETs declined following the 1989 American Orthopaedic Society for Sports Medicine Snowmass Consensus, which cautioned against the routine use of extra-articular reconstructions.[1,3] Interest in lateral extra-articular procedures (LEAPs), including LETs, was renewed following the description of the anterolateral ligament (ALL) and its role in

From the Centre Orthopédique Santy, FIFA Medical Center of Excellence, Hôpital Privé Jean Mermoz, Groupe GDS-Ramsay, Lyon, France (B.S-C., T.D.V.); La Sapienza University, Dipartimento di Sanità Pubblica e Malattie Infettive, Rome, Italy (A.C., E.M.); Department of Orthopedic Surgery, University of Arizona, Tucson, Arizona, U.S.A. (A.S.); Department of Orthopaedic Surgery, University of Pittsburgh, Pittsburgh, PA, U.S.A. (V.M.); Fowler Kennedy Sport Medicine Clinic, University of Western Ontario, London, Ontario, Canada (A. Getgood); Aspetar Orthopaedic and Sports Medicine Hospital, Doha, Qatar (A. Getgood, P.V.); Grupo de Joelho, Instituto de Ortopedia e Traumatologia, Hospital das Clínicas HCFMUSP Faculdade de Medicina, Universidade de São Paulo, São Paulo, SP, Brazil (C.P.H.); Hospital Sírio Libanês, São Paulo, SP, Brazil (C.P.H.).

Received March 6, 2025; accepted June 13, 2025.

Address correspondence to Thais Dutra Vieira, M.D., 24 Avenue Paul Santy 69008, Lyon, France. E-mail: thaisdutravieira@hotmail.com

0749-8063/25451/$36.00
https://doi.org/10.1016/j.arthro.2025.06.013

rotational knee stability and also considering that the results of ACL reconstructions were not perfect with an isolated intra-articular reconstruction technique.[4]

Moreover, during the past decade, several studies have shown the effectiveness of LEAPs, including LETs and anterolateral ligament reconstruction (ALLR), when combined with ACL reconstruction in reducing failure rates and improving rotational stability of the knee.[5-9] Despite the evidence, the routine use of LEAPs combined with ACL reconstruction, particularly in primary surgery, remains controversial, probably due to a high variability of existing techniques that do not have long-term follow-up. In particular, there have been concerns about potential adverse events associated with LEAPs, some of them related to the practice of extra-articular reconstructions carried out in isolation in the past; this has the ongoing debate about the optimal surgical technique and highlighted the need for caution regarding issues such as increased intra- and postoperative complications, possible delays in postoperative recovery, and increased risk of lateral compartment overconstrain.[10,11]

Thus, the purpose of this project is to establish an expert consensus on the surgical techniques, complications, and rehabilitation protocols associated with LEAPs as an adjunct to ACL reconstruction.

Our hypothesis was that consensus would be reached on specific risk factors that are widely accepted to justify combined procedures, whereas other potential indications would remain controversial. In addition, we hypothesized that there would be consensus on the majority of statements regarding surgical techniques and complications associated with combined ACL reconstruction and LEAPs.

Methods

Consensus Design

This consensus is divided into 2 parts to comprehensively address the use of LEAPs in ACL reconstruction. Part I focuses on establishing expert agreement on the indications for performing LEAPs, while Part II addresses surgical techniques, complications, and rehabilitation protocols.[12] A modified Delphi consensus process was conducted, a method commonly used in sports medicine and orthopaedic research that involves multiple rounds of anonymous surveys.[13-15] This LEAP consensus follows the anterolateral complex of the knee consensus held in London in 2017 and published in 2019, focused on the anatomy and biomechanical properties of the anterolateral complex of the knee.[16] A working group of 7 experts developed 36 statements, 21 on the indications and 15 on the techniques and complications of LEAP in ACL reconstruction, based on the most up-to-date literature. The list of participants was established by the steering committee: Bertrand Sonnery-Cottet, Alan Getgood, Camilo Helito, and Volker Musahl. These authors contributed to the creation of consensus participants and recommended individuals to be involved in the process. Recent conference and publications from the Anterior Cruciate Ligament Study Group, the American Orthopaedic Society for Sports Medicine, the European Society of Sports Traumatology, and the International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine groups and various international conferences were screened to identify invited speakers whose research focused on the ACL, to ensure that opinion leaders in the field were invited. In addition, we sought to include surgeons from several countries to take account of different philosophies and viewpoints. Finally, a selection of 58 international experts in the management of ACL injuries from 17 different countries across 5 continents, over 50% of whom are members of the ACL Study Group, extended to other recognized experts in the field, including pediatric surgeons and rehabilitation specialists, participated in this consensus.

The expert panel initially included 57 voting members. Two online rounds were completed, followed by a final in-person round on November 8, 2024, chaired by Adnan Saithna and moderated by Alan Getgood, Bertrand Sonnery-Cottet, Camilo Partezani Helito, and Volker Musahl. During the first and second rounds, participants were provided with brief notes for each proposed statement, including a summary of the relevant clinical outcomes and supporting literature. Panelists' responses were collected anonymously to ensure independent and unbiased input. In the third round, although participants were present and shared their views during live discussions, voting remained confidential: the voting process was online and anonymized so that neither the steering committee nor the participants could see individual votes or identify specific voter responses. Only aggregated percentages were visible to the group. After the survey was closed, access to unblinded individual responses was limited to the data manager. After each round, responses were compiled, analyzed, and shared with the panel. Participants were encouraged to review their feedback in light of the group's collective input, enabling adjustments and improvements to the statements. This iterative process of gathering and refining feedback continued until a strong consensus was achieved. After each round, responses were compiled, analyzed, and shared with the panel. Participants were encouraged to review their feedback in light of the group's collective input, enabling adjustments and improvements to the statements. This iterative process of gathering and refining feedback continued until a strong consensus was achieved.

Consensus Process

In the first round, the expert panel received a link to a survey (SurveyMonkey) via e-mail and was asked to evaluate the appropriateness of statements. A list of statements was developed based on a comprehensive review of the existing literature and categorized into 3 domains: indications, techniques, and complications. In each round, panelists independently rated the appropriateness of each statement using a 9-point Likert scale, where scores of 1 to 4 indicated "inappropriate," 5 indicated "uncertain," and 6 to 9 indicated "appropriate." When a statement was rated as inappropriate or uncertain, panelists were invited to provide open-ended comments explaining what changes would be necessary for them to consider the statement appropriate. These qualitative responses were used to refine and clarify statements between rounds, in keeping with the iterative nature of the Delphi method. The panelists were encouraged to base their evaluations on a summary of evidence provided by the core group guiding the consensus process, without factoring in the cost of the procedure.

Statements were classified as follows:

- "Appropriate" if they achieved a median score of $\geq$7 without disagreement among the panelists
- "Inappropriate" if they received a median score of $\leq$3 without disagreement

Statements that did not meet these criteria were revised and rephrased based on the panel's comments, then subjected to revoting in subsequent rounds to refine and clarify their content (Table 1).

In the second round, the same process was performed. At this time, if there were no missing values, one of the scores could be excluded from the analysis of the degree of agreement according to the following rules:

- The minimum value is excluded if the median is strictly greater than 5.
- The maximum value is excluded if the median is less than or equal to 5.

After applying the rules outlined in Table 1, only statements that met the "strongly agree" mark were accepted as they were. Statements that did not meet these criteria were revised and rephrased based on the panel's comments. They were then subjected to revoting in subsequent rounds to refine and clarify their content.

Table 1. Round 1 and 2 Statement Scoring System

Proposal	Agreement Among Experts	Distribution of Scores	Median
Appropriate	Strong agreement	[7-9]	$\geq$7
	Relative agreement	[5-9]	$\geq$7
Inappropriate	Strong agreement	[1-3]	$\leq$3
	Relative agreement	[1-5]	$\leq$3.5
Uncertain	Undecided	[1-9]	[4-6.5]
	No consensus	Other situations	

Final Voting

Fifty-seven experts were invited to participate in the online rounds, and 55 voters were present in the third round, of which 10 were online voters, resulting in an overall dropout rate of 3.5%. A 5-point Likert scale was used during an in-person meeting, with a direct vote facilitated by Adnan Saithna, Alan Getgood, Alessandro Carrozzo, Camilo Partezani Helito, and Thais Dutra Vieira. Respondents rated statements as follows: strongly disagree, disagree, undecided, agree, and strongly agree.

Responses were analyzed with stricter cutoff criteria: items were only considered to have reached consensus if more than 75% of respondents agreed (either "agree" or "strongly agree"). Agreement among $\geq$75% of the participants has previously been noted to be the most frequently specified determination of a consensus for Delphi studies.[13-15]

Consensus was defined based on the combined percentage of respondents selecting "strongly agree" or "agree." The levels of consensus were categorized as follows: unanimous consensus (100%), strong consensus (90%-99.9%), consensus (75%-89.9%), and no consensus (<75%). Statements were assigned a strength of recommendation: "Strongly recommended," "Recommended," "Should be considered," and "Could be considered." If a statement did not receive sufficient support with the proposed wording, the wording was adjusted, and voting was repeated until consensus was reached, or it was determined that no feasible wording could achieve agreement.

Results

The level of consensus was assessed for 16 statements regarding surgical techniques and complications of LEAPs. Of these statements, 6 achieved unanimous consensus (100%), 3 achieved strong consensus (90%-99.9%), and 3 achieved consensus (75%-89.9%), with none of the statements not reaching consensus (<75%). Four statements were removed. The distribution of agreement is summarized in Table 2.

Technical Recommendations

The panel strongly advocated certain surgical principles. When using an iliotibial graft (ITB) graft, it was considered essential to pass the graft deep to the lateral collateral ligament (LCL). For ALLR, femoral fixation should be placed proximal and posterior to the lateral femoral epicondyle and performed in full extension and neutral rotation.

Regarding fixation methods, there was unanimous agreement that staples, screws, sutures, or anchors are all acceptable. In addition, ITB-based grafts should be fixed

Table 2. All the Statements Related to Surgical Techniques and Complications for Combined Procedures Along With Their Corresponding Levels of Agreement: Unanimous Consensus (100%), Strong Consensus (90%-99.9%), Consensus (75%-89.9%), and No Consensus (<75%)

Statement Number	Statement Text	% Agreement	Consensus
21	The following options are the available surgical techniques in the armamentarium for lateral extra-articular procedures: Lemaire and modified Lemaire, anterolateral ligament reconstruction, Ellison and modified Ellison, McIntosh, Arnold-Coker, Marcacci-Zaffagnini, and Kocher Micheli.		Removed
22	No single lateral extra-articular procedure has been proven to be clinically superior to another.	77.3	Consensus
23	When performing LEAP with the ITB graft, passing the graft deep to the LCL is strongly recommended.	93.3	Strong Consensus
24	The ITB graft should be fixed in neutral rotation, with low tension. Its fixation can be performed between 0° and 60° degrees of knee flexion.	86	Consensus
25	LEAP fixation can be performed using a staple, screw, suture, or suture anchor.	100	Unanimous
26	In anterolateral ligament reconstruction, it is strongly recommended that the fixation is performed in full extension and neutral rotation.	80.6	Consensus
27	In anterolateral ligament reconstruction, it is strongly recommended that the femoral fixation is placed proximal and posterior to the lateral femoral epicondyle.	100	Unanimous
28	In pediatric patients, it is mandatory to adapt the LEAP technique to avoid injury to the physes.	100	Unanimous
30	Although there are complications related to LEAP, the overall rate is low.	100	Unanimous
31	Despite previous concerns of altered biomechanics following LEAP, recent clinical studies do not show an increased rate of OA of the lateral compartment.	100	Unanimous
32	Lateral side pain, tunnel convergence, hardware removal, scar aesthetic issue, stiffness, hematoma, and infection are the possible complications of combined ACL + LEAP surgery.		Removed
33	No changes to rehabilitation programs are required following combined ACL and LEAP surgery.	100	Unanimous
34	Combined ACL and LEAP surgery does not negatively affect return to sport.	100	Unanimous
35	While tunnel convergence remains a significant technical concern in combined ACL and LEAP procedures, continuous ACL + LEAP graft, modern surgical techniques, fixation devices, and arthroscopic control can mitigate these risks.		Removed
36	There are a number of relative indications that, when considered together, may reach a threshold at which LEAP is recommended in addition to ACL reconstruction.	97.1	Strong Consensus

ACL, anterior cruciate ligament; ITB, iliotibial band; LCL, lateral collateral ligament; LEAP, lateral extra-articular procedure; OA, osteoarthritis.

in neutral rotation with low tension at a knee flexion angle between 0° and 60°. Also, there was agreement that no single LEAP technique is clinically superior.

Safety and Complications

There was unanimous agreement that LEAPs are associated with a low complication rate, with no evidence of an increased risk of lateral compartment osteoarthritis. In pediatric patients, adaptation of the technique to avoid physeal injury was considered essential.

Importantly, the panel agreed that adding a LEAP to ACL reconstruction does not require changes to standard rehabilitation protocols and does not negatively impact return-to-sport timelines.

Statements That Were Removed

Four statements regarding the techniques or the complications of combined ACL reconstruction (ACLR) and LEAP were removed. A proposed list of available LEAP techniques (statement 21) was withdrawn in favor of presenting data from a survey of the panel's preferred approaches (Fig 1). Statement 29, which addressed the use of intraoperative ultrasound for ALL graft positioning, was removed after it became clear that most panelists lacked sufficient experience with this technique. Two additional statements (statements 32 and 35) related to potential complications of combined ACLR and LEAP procedures were also excluded. The panel agreed that these complications, such as tunnel convergence, lateral pain, or hardware-related issues, did not require consensus and were better addressed through narrative discussion in the manuscript.

Discussion

The most important finding is the high level of agreement on surgical techniques and the low complication rates associated with LEAPs when combined with ACLR by a qualified group of surgeons that performs these procedures routinely. All the statements voted achieved either unanimous, strong consensus, or consensus, highlighting key operative and postoperative considerations that can be readily incorporated into clinical practice.

Among the unanimously agreed-on statements, the importance of routing the strip of the ITB under the LCL (statement 23) is consistent with previous biomechanical evidence suggesting that this passage helps maintain favorable graft tension and restores knee kinematics.[17-20] Also, most of the existing clinical studies adopt this practice, so there is currently no reason to

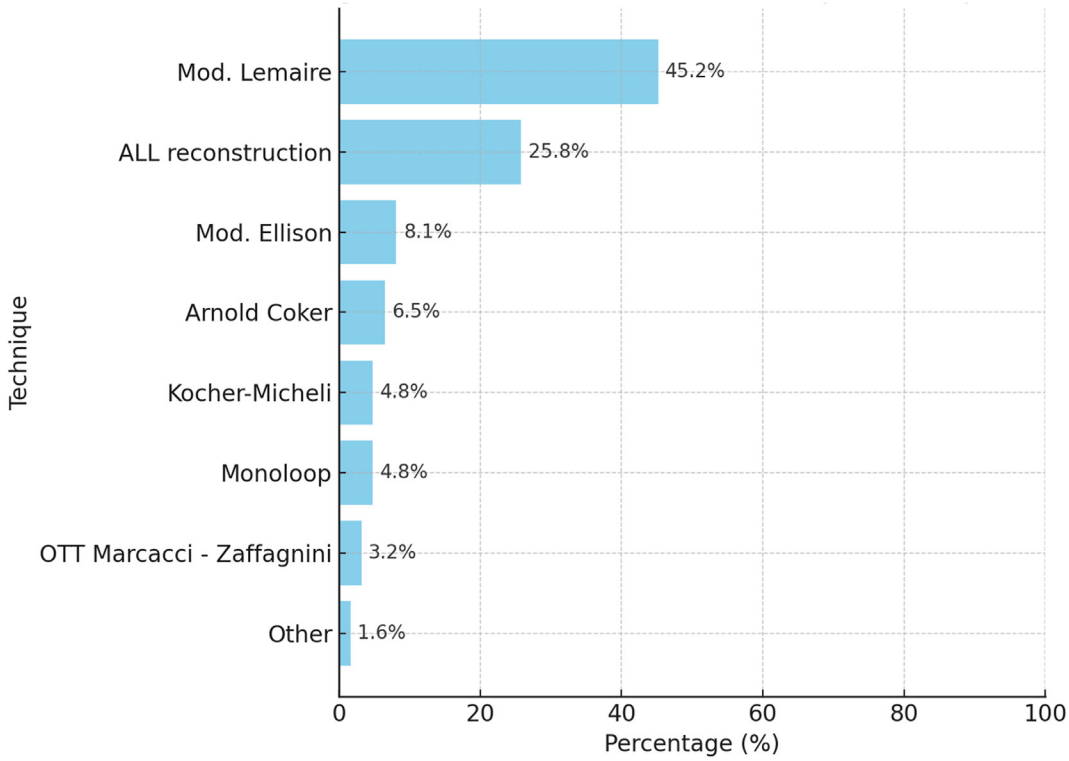

Fig 1. Results of the survey on respondents' preferred techniques for performing lateral extra-articular procedures.

adopt the passage of the graft over the LCL in this type of technique without further study. Similarly, the recommendation to position the femoral ALL graft fixation proximal and posterior to the lateral femoral epicondyle (statement 27) underscores the importance of an anatomic reconstruction, leading to favorable anisometry—with the graft being tight in extension and slack in flexion—preventing overconstraint and restoring native knee kinematics.[17,18,21,22] These technical principles aim to optimize extra-articular graft function while minimizing the risk of abnormal knee kinematics, residual laxity, or unwanted joint stiffness.

Statements on complications provided reassurance about the safety of LEAPs. The panel unanimously agreed that the overall complication rate is low (statement 30) and that there is no increased risk of lateral compartment osteoarthritis (statement 31). Advances in knee biomechanics, surgical techniques, and modern rehabilitation protocols have likely played a role in reducing the complication rates previously observed when LEAPs were performed frequently as isolated procedures. The STABILITY trial recently provided strong evidence to support the addition of LET to hamstring tendon autograft ACLR in young, high-risk patients. Over a 2-year follow-up period, the study showed a significant reduction in graft rupture rates in the ACLR combined with LET group (4%) compared to ACLR alone (11%, $P < .001$), representing a relative risk reduction of 67%.[5] This study confirmed that concerns about increased complications with LET are not supported by recent literature. There were no significant differences in effusion, infection rates, or overall reoperation rates between the groups. Although the ACLR combined with LET group had a slightly higher rate of hardware removal (10 vs 4 cases), the overall incidence of minor medical (11%) and surgical (7%) events remained low, particularly given the high-risk nature of the patient population. Ripoll et al.[23] also showed a very low rate of complications when evaluating ALLR, and most were related to irritation that led to further hardware removal. In addition, while patients in the LET group reported greater pain at 3 months, this difference was not clinically significant at later follow-ups, and range of motion was comparable between groups.[24] The incidence of lateral pain between ALLR and LET also seems to be similar, with a possible greater durability in cases of LET but not lasting more than 4 months postoperatively.[25]

Sonnery-Cottet et al.[26] conducted an interim analysis of the SANTI randomized controlled trial to evaluate the safety and outcomes of combined ACL and ALLR compared with isolated ACLR. Their results showed that the ACL and ALLR group had significantly lower reoperation rates for cyclops syndrome (0% vs 8.9%, $P = .0012$), while showing no increase in complications such as infection, venous thromboembolism, or arthrofibrosis. In addition, there were no significant differences in graft rupture rates, range of motion, or

pain between the 2 groups. A recent systematic review and meta-analysis on randomized controlled trials compared isolated ACLR with ACLR combined with LET or ACLR combined with ALLR.[27] The study confirmed that failure rates were significantly lower in the combined groups and that despite previous concerns about overloading, stiffness, infection, tunnel convergence, and increased surgical complexity, the analysis found no significant difference in complication rates between ACLR and ACLR combined with ALLR ($P = .91$) or between ACLR and ACLR combined with LET ($P = .36$).

Another key finding of this consensus is the conclusion that combining LEAPs with ACL reconstructions does not require changes in rehabilitation protocols (statement 33) or negatively affects return to sport (statement 34). These statements suggest that the addition of a LEAP does not require more conservative postoperative management. Also, subjective knee function scores and time to return to sport are comparable between isolated ACL reconstructions and ACL reconstructions combined with lateral procedures.[28-30]

Getgood et al.[31] recently reported that patients who underwent ACLR and LET had inferior knee function (including lower self-reported knee function and lower peak quadriceps torque and mean power) at 6 months postoperatively compared with those who underwent isolated ACLR, but these differences between the groups had resolved by 12 months. Coquard et al.[30] recently conducted a retrospective analysis of data from patients who underwent ACLR with hamstring autograft, comparing those who had an isolated ACLR to those who had a combined ACLR and ALLR. The groups were matched 1:1. Outcome measures included the Tegner Activity Scale and the Knee Santy Athletic Return to Sport score assessing neuromuscular control, limb symmetry, agility, and psychological readiness. Results from 111 matched pairs showed no significant differences in the overall Knee Santy Athletic Return to Sport or Tegner scores between groups at 6 months. The study concluded that the addition of ALLR does not delay functional recovery and showed no disadvantage in neuromuscular control, limb symmetry, agility, or psychological readiness in the ALLR and ACLR group compared to the isolated ACLR group. Also, Gillet et al.[32] also reported that the addition of an ALLR did not alter the recovery of isokinetic muscle strength measured 6 months after ACLR. Combined ACLR and ALLR required the additional harvesting of the gracilis tendon (in addition to the Semitendinosus tendon), and postoperative strength recovery was not significantly different from that of isolated ACLR.

Despite strong consensus on key surgical principles, 3 statements reached the standard consensus threshold (75%-89.9%), reflecting remaining debate on certain technical details. For example, although the panel agreed that no single LEAP technique is clearly superior to another (statement 22), it remains possible that individual factors (e.g., ACL graft choice or patients' characteristics) may favor one approach over another in certain settings. In addition, statements regarding recommended fixation angles (e.g., 0°-60° of flexion for ITB-based procedures vs full extension for ALL reconstruction) highlight the variability that still exists among experts (statements 24 and 26). It is important to mention that there is more variability in LET fixation angle in the literature. In contrast, the largest series that describes ALLR recommend fixing the graft in full extension and neutral rotation.[26,33,34]

Four statements were removed prior to voting from the final analysis for various reasons, including a lack of collective experience (intraoperative ultrasound for ALL graft positioning) and overlap with other items that did not require consensus, such as discussions of complications or broad lists of surgical techniques. The panelists concluded that these complications associated with LEAPs are uncommon but may include lateral pain, LCL injury, quadriceps inhibition, tunnel convergence, symptomatic hardware requiring removal, aesthetic concerns related to scarring, stiffness, hematoma, and infection. However, it is likely that the most significant complications are related to inadequate surgical techniques, which can happen during the surgeons' learning curve, and if the reconstruction principles reported in this consensus are followed, the probability of complications is low.[35-38]

Limitations

First, as consensus statements inherently reflect expert opinion, they represent Level V evidence and are subject to the limitations associated with this type of data. The selection and allocation of panel members may introduce inherent bias.[39,40] Despite efforts to ensure broad international representation and multidisciplinary expertise, the predominance of high-volume surgeons and recognized experts who could have a predisposition in favor of LEAPs may have introduced selection bias. The statements' development was not based on a standardized process but was led by a subgroup of the Steering Committee. Nevertheless, participants were given the opportunity to suggest modifications to the statements during each round of the Delphi process, allowing for iterative refinement based on collective feedback.

Conclusions

Consensus defined core surgical principles and confirmed the safety of adding LEAPs to ACL reconstruction. When an ITB graft is used, it should be routed deep to the LCL and fixed between 0° and 60° of knee flexion under low tension. For ALLR, femoral fixation

should be in full extension at a posterior-proximal point relative to the lateral epicondyle. Although no single LEAP proved superiority, adherence to these principles permits safe, effective surgery without altering standard rehabilitation or return-to-sport protocols and without elevating osteoarthritic risk.

Disclosures

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: A.J.K. is a consultant or advisor for Arthrex. R.B.L. has received financial support from Arthrex; is a consultant or advisor for Smith & Nephew; has received speaking and lecture fees from Arthrex and Smith & Nephew; and has received funding grants from Smith & Nephew. R.L. has received funding grants from Ossur, Smith & Nephew, Arthroscopy Association of North America, and American Orthopaedic Society for Sports Medicine; is a consultant or advisor for Ossur, Smith & Nephew, and Responsive Arthroscopy; has received travel reimbursement from Smith & Nephew; has received speaking and lecture fees from Foundation Medical, LLC; and has a patent with royalties paid to Ossur. T.L. is a consultant or advisor for Smith & Nephew and Medacta International SA; has received speaking and lecture fees from Smith & Nephew, Arthrex, and Medacta International SA; has received funding grants from Smith & Nephew and Arthrex; has received travel reimbursement from Smith & Nephew, Arthrex, and Medacta International SA; and has received nonfinancial support from Smith & Nephew. W.L. is a consultant or advisor for Arthrex. G.M. is a consultant or advisor for Smith & Nephew; has received funding grants from Smith & Nephew; and is a board member of the *Journal of Bone and Joint Surgery*, International Society of Arthroscopy, Knee Surgery, and Orthopaedic Sports Medicine, and European Society of Sports Traumatology, Knee Surgery and Arthroscopy. R.M. has equity or stocks with MEND; is a board member of the International Society of Arthroscopy, Knee Surgery, and Orthopaedic Sports Medicine; and has a book published with Springer and Demos Health with royalties paid to the author. C.P. is a consultant or advisor for Arthrex and is employed by Public Assistance Hospitals Paris. D.P. has received speaking and lecture fees from Smith & Nephew and Arthrex; is a consultant or advisor for Smith & Nephew; has received travel reimbursement from Smith & Nephew; has equity or stocks with Personalised Surgery; is a board member of AJSM, OJSM, APSMART, JISAKOS, and the International Society of Arthroscopy, Knee Surgery, and Orthopaedic Sports Medicine; and has received funding grants from Zimmer Biomet. P.S. is a consultant or advisor for Arthrex; receives funding grants, nonfinancial support, speaking and lecture fees, and travel reimbursement from Arthrex; and is a stockholder for Spinal Simplicity. S.S. holds committee positions for AANA, AAOS, ACLSG, AOSSM, Biologic Alliance, ICRS, and Ortho Summit (OSET); is on the editorial board for *Orthopedics Today*, *Current Reviews in Musculoskeletal Medicine*, and *VJSM*; is a course chair of ISMF and the PFF Masters Course; is also on the board of directors for ISAKOS and ACL Study Group; is a paid educational consultant for Arthrex, Kinamed, and LifeNet; is a paid advisory board member for Ostesys, Reparel, Sarcio, Sparta Biomedical, Vericel, and Vivorte; is on design teams and receives royalties from ConMed and DJO; holds stock and stock options for Epicrispr BioTech, Icarus Medical, Moximed, Sarcio, and Reparal; holds stock options only for Arcuro Medical, Kyniska Robotics, Sparta Biomedical, and Vivorte; holds restricted stock awards (RSA) for BioEnthesis and Sparta Biomedical; receives research support from Allosource, JRF, Kinamed, Miach Orthopaedics, Octane Biotherapeutics, Organogenesis, Ossio, Smith & Nephew, and University of Pittsburg. T.S. reports administrative support was provided by Arthrex, is a consultant or advisor for CONMED, has received speaking and lecture fees from CONMED, and has a patent with royalties paid to CONMED. P.V. is a consultant or advisor for CONMED. A.W. is a board member of the *American Journal of Sports Medicine*, Anterior Cruciate Ligament Study Group, and International Society of Arthroscopy, Knee Surgery, and Orthopaedic Sports Medicine; has received nonfinancial support from the Anterior Cruciate Ligament Study Group; has equity or stocks with Innovate Orthopaedics Limited, DocComm, and Fortius Clinic; is a consultant or advisor for Smith & Nephew; and has received speaking and lecture fees, travel reimbursement, and funding grants from Smith & Nephew. S.W.Y. has received travel reimbursement from Arthrex, has received research support from Stryker and Smith & Nephew, and is a consultant for Stryker. F.C. is a Chair, Board of Trustees, JSES. R.F. is the Editor in Chief of JCJP and Associate Editor for JSES. All other authors (A.C., V.M., D.B., E.C., E.H., G.H., C.K., M.K., H.K., P.M., T.N., H.O., V.B.d.C.P., E.S., S.T., J.X.) declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

Arthrex provided valuable support in organizing this meeting. The authors sincerely acknowledge their generous contribution.

References

1. Ferretti A. Extra-articular reconstruction in the anterior cruciate ligament deficient knee: A commentary. *Joints* 2014;2:41-47.
2. DePhillipo NN, Cinque ME, Chahla J, Geeslin AG, LaPrade RF. Anterolateral ligament reconstruction techniques, biomechanics, and clinical outcomes: A systematic review. *Arthroscopy* 2017;33:1575-1583.
3. Pearle A, Bergfeld J. *Extraarticular Reconstruction in the Anterior Cruciate Ligament Deficient Knee*. Champaign, IL: Human Kinetics Publishers, 1992.
4. Claes S, Vereecke E, Maes M, Victor J, Verdonk P, Bellemans J. Anatomy of the anterolateral ligament of the knee. *J Anat* 2013;223:321-328.
5. Getgood AMJ, Bryant DM, Litchfield R, et al. Lateral extra-articular tenodesis reduces failure of hamstring tendon autograft anterior cruciate ligament reconstruction: 2-Year outcomes from the STABILITY study randomized clinical trial. *Am J Sports Med* 2020;48:285-297.
6. Sonnery-Cottet B, Saithna A, Cavalier M, et al. Anterolateral ligament reconstruction is associated with significantly reduced ACL graft rupture rates at a minimum follow-up of 2 years: A prospective comparative study of 502 patients from the SANTI Study Group. *Am J Sports Med* 2017;45:1547-1557.
7. Guy S, Fayard JM, Saithna A, et al. Risk of graft rupture after adding a lateral extra-articular procedure at the time of ACL reconstruction: A retrospective comparative study of elite alpine skiers from the French National Team. *Am J Sports Med* 2022;50:1609-1617.
8. Borque KA, Jones M, Laughlin MS, et al. Effect of lateral extra-articular tenodesis on the rate of revision anterior cruciate ligament reconstruction in elite athletes. *Am J Sports Med* 2022;50:3487-3492.
9. Bosco F, Giustra F, Masoni V, et al. Combining an anterolateral complex procedure with anterior cruciate ligament reconstruction reduces the graft reinjury rate and improves clinical outcomes: A systematic review and meta-analysis of randomized controlled trials. *Am J Sports Med* 2024;52:2129-2147.
10. Sherman SL, Calcei J, Ray T, et al. ACL Study Group presents the global trends in ACL reconstruction: Biennial survey of the ACL Study Group. *J ISAKOS* 2021;6:322-328.
11. Tuca M, Valderrama I, Eriksson K, Tapasvi S. Current trends in anterior cruciate ligament surgery. A worldwide benchmark study. *J ISAKOS* 2023;8:2-10.
12. Sonnery-Cottet B, Carrozzo A, Saithna A, et al. Indications for lateral extra-articular procedures in the anterior cruciate ligamente—reconstructed knee. Part I of an international consensus statement. *Arthroscopy* 2025;41:3303-3312.
13. Murray IR, Makaram NS, Geeslin AG, et al. Multiligament knee injury (MLKI): An expert consensus statement on nomenclature, diagnosis, treatment and rehabilitation. *Br J Sports Med* 2024;58:1385-1400.
14. Tischer T, Beaufilis P, Becker R, et al. Management of anterior cruciate ligament revision in adults: The 2022 ESSKA consensus part I—diagnostics and preoperative planning. *Knee Surg Sports Traumatol Arthrosc* 2023;31:4642-4651.
15. Diamond IR, Grant RC, Feldman BM, et al. Defining consensus: A systematic review recommends methodologic criteria for reporting of Delphi studies. *J Clin Epidemiol* 2014;67:401-409.
16. Getgood A, Brown C, Lording T, et al. The anterolateral complex of the knee: Results from the International ALC Consensus Group Meeting. *Knee Surg Sports Traumatol Arthrosc* 2019;27:166-176.
17. Inderhaug E, Stephen JM, Williams A, Amis AA. Biomechanical comparison of anterolateral procedures combined with anterior cruciate ligament reconstruction. *Am J Sports Med* 2017;45:347-354.
18. Inderhaug E, Stephen JM, Williams A, Amis AA. Anterolateral tenodesis or anterolateral ligament complex reconstruction: Effect of flexion angle at graft fixation when combined with ACL reconstruction. *Am J Sports Med* 2017;45:3089-3097.
19. Neri T, Dabirrahmani D, Beach A, et al. Different anterolateral procedures have variable impact on knee kinematics and stability when performed in combination with anterior cruciate ligament reconstruction. *J ISAKOS* 2021;6:74-81.
20. Kittl C, Halewood C, Stephen JM, et al. Length change patterns in the lateral extra-articular structures of the knee and related reconstructions. *Am J Sports Med* 2015;43:354-362.
21. Delaloye JR, Hartog C, Blatter S, et al. Anterolateral ligament reconstruction and modified Lemaire lateral extra-articular tenodesis similarly improve knee stability after anterior cruciate ligament reconstruction: A biomechanical study. *Arthroscopy* 2020;36:1942-1950.
22. Imbert P, Lutz C, Daggett M, et al. Isometric characteristics of the anterolateral ligament of the knee: A cadaveric navigation study. *Arthroscopy* 2016;32:2017-2024.
23. Ripoll T, Moreira da Silva AG, Saoudi S, et al. Comparison between continuous and separate grafts for ALL reconstruction when combined with ACL reconstruction: A retrospective cohort study from the SANTI Study Group. *Am J Sports Med* 2023;51:3163-3170.
24. Heard M, Marmura H, Bryant D, et al. No increase in adverse events with lateral extra-articular tenodesis augmentation of anterior cruciate ligament reconstruction—results from the stability randomized trial. *J ISAKOS* 2023;8:246-254.
25. Helito CP, Sobrado MF, Moreira da Silva AG, et al. The addition of either an anterolateral ligament reconstruction or an iliotibial band tenodesis is associated with a lower failure rate after revision anterior cruciate ligament reconstruction: A retrospective comparative trial. *Arthroscopy* 2023;39:308-319.
26. Sonnery-Cottet B, Pioger C, Vieira TD, et al. Combined ACL and anterolateral reconstruction is not associated with a higher risk of adverse outcomes: Preliminary results from the SANTI randomized controlled trial. *Orthop J Sports Med* 2020;8:2325967120918490.
27. D'Ambrosi R, Corona K, Cerciello S, et al. Combining an anterolateral complex procedure with anterior cruciate ligament reconstruction reduces graft reinjury without increasing the rate of complications: A systematic review

and meta-analysis of randomized controlled trials. *Am J Sports Med* 2025;53:2462-2470.
28. Weaver AP, Harkey MS, Pacicca DM, et al. Evaluation of thigh muscle strength in adolescent patients after anterior cruciate ligament reconstruction with lateral extra-articular tenodesis or anterolateral ligament reconstruction. *Orthop J Sports Med* 2025;13:23259671241306000.
29. Lumban-Gaol I, Putramega D, Phatama KY, Utomo DN, Budhiparama NC. Greater return to sports after anterior cruciate ligament reconstruction combined with anterolateral ligament reconstruction compared with anterior cruciate ligament reconstruction alone: A systematic review and meta-analysis. *J Exp Orthop* 2025;12:e70127.
30. Coquard M, Carrozzo A, Saithna A, et al. Anterolateral ligament reconstruction does not delay functional recovery, rehabilitation, and return to sport after anterior cruciate ligament reconstruction: A matched-pair analysis from the SANTI (Scientific ACL Network International) Study Group. *Arthrosc Sports Med Rehabil* 2022;4:e9-e16.
31. Getgood A, Hewison C, Bryant D, et al. No difference in functional outcomes when lateral extra-articular tenodesis is added to anterior cruciate ligament reconstruction in young active patients: The Stability Study. *Arthroscopy* 2020;36:1690-1701.
32. Gillet B, Blache Y, Rogowski I, et al. Isokinetic strength after ACL reconstruction: Influence of concomitant anterolateral ligament reconstruction. *Sports Health* 2022;14:176-182.
33. Sonnery-Cottet B, Lutz C, Daggett M, et al. The involvement of the anterolateral ligament in rotational control of the knee. *Am J Sports Med* 2016;44:1209-1214.
34. Sonnery-Cottet B, Thaunat M, Freychet B, Pupim BHB, Murphy CG, Claes S. Outcome of a combined anterior cruciate ligament and anterolateral ligament reconstruction technique with a minimum 2-year follow-up. *Am J Sports Med* 2015;43:1598-1605.
35. Thaunat M, Clowez G, Saithna A, et al. Reoperation rates after combined anterior cruciate ligament and anterolateral ligament reconstruction: A series of 548 patients from the SANTI Study Group with a minimum follow-up of 2 years. *Am J Sports Med* 2017;45:2569-2577.
36. Grassi A, Olivieri Huerta RA, Lucidi GA, et al. A lateral extra-articular procedure reduces the failure rate of revision anterior cruciate ligament reconstruction surgery without increasing complications: A systematic review and meta-analysis. *Am J Sports Med* 2024;52:1098-1108.
37. Buisson M, Zadem A, Gancel E, Kajetanek C. Learning curve for combined reconstruction of the anterolateral and anterior cruciate ligaments: A report of 108 cases with a single surgeon. *Orthop Traumatol Surg Res* 2025;111:104077.
38. Lôbo CFT, Helito PVP, Bordalo-Rodrigues M, Helito CP. Computed tomography (CT), X-ray, and MRI evaluation of two anterolateral knee reconstruction techniques: Lateral extra-articular tenodesis (LET) and the anterolateral ligament (ALL) reconstruction. *Skeletal Radiol* 2020;49:1037-1049.
39. Hohmann E, Cote MP, Brand JC. Research pearls: Expert consensus based evidence using the Delphi method. *Arthroscopy* 2018;34:3278-3282.
40. Hohmann E, Brand JC, Rossi MJ, Lubowitz JH. Expert opinion is necessary: Delphi panel methodology facilitates a scientific approach to consensus. *Arthroscopy* 2018;34:349-351.