International Delphi consensus on wound closure and dressing management in total knee and total hip arthroplasty

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INTRODUCTION: Optimal wound healing is extremely important when trying to avoid various complications after total knee arthroplasty (TKA) and total hip arthroplasty (THA). Published systematic literature reviews indicate that there are few studies on wound closure and dressing management after TKA and THA, with little consensus on best practices. The purpose of this modified Delphi study was to obtain consensus on optimal wound closure and dressing management in TKA and THA using an evidence-based approach.

METHODS: The panel included 20 orthopaedic surgeons from Europe, the United States, and Canada. There were 40 statements identified using a targeted literature review. Topics evaluated included surgical technique, tourniquets, drains, venous thromboembolism prophylaxis, barbed sutures, triclosan-coated sutures, mesh adhesives, silver-impregnated dressings, and negative pressure wound therapy. Consensus was developed on the statements with up to three rounds of anonymous voting per topic. Panelists ranked their agreement with each statement on a five-point Likert scale. An *a priori* threshold of ≥75% was required for consensus.

RESULTS:

All 40 statements reached consensus (Figure 1). Notable recommendations include: 1) TKA-Closing in semi-flexion versus extension (superior range of motion); 2) TKA-using aspirin for venous thromboembolism prophylaxis over other agents (reduces wound complications); 3) TKA/THA-using barbed sutures over non-barbed sutures (lower wound complications, better cosmetic appearances, shorter closing times, and overall cost savings); 4) TKA/THA-using mesh adhesives over other skin closure methods (lower wound complications, higher patient satisfaction scores, lower rates of readmission); 5) TKA/THA-using negative pressure wound therapy over other dressings for at-risk patients (lower wound complications, fewer reoperations, and fewer dressing changes); and 6) TKA/THA use triclosan-coated sutures over standard sutures (lower risk of surgical site infection).

DISCUSSION AND CONCLUSION:

Using a modified Delphi approach, a panel of 20 orthopaedic surgeons achieved consensus on 40 statements pertaining to wound closure and dressing management in TKA and THA.

Figure 1: Final Level of Agreement for the 40 Consensus Statements on Wound Closure in TKA Knee and THA

Consensus Statement	Level of Agreement, % (N/n)
TOTAL KNEE ARTHROPLASTY	
Positioning and approaches	
There is superior function/range of motion outcomes for total knee arthroplasty closure in (semi-) flexion vs extension	90% (18/20)
There are no differences in wound complication rates between the mini-subvastus and medial parapatellar approaches for total knee arthroplasty	100% (20/20)
There is insufficient evidence that patella eversion and tibial translation are associated with worse wound healing in patients undergoing total knee arthroplasty	90% (18/20)
Tourniquets	
Limited evidence indicates there may be a trend towards an increase in wound complications with tourniquet use in total knee arthroplasty, and further studies are warranted	95% (19/20)
Drains	
There are no differences in wound complications rates with and without the use of a drain during total knee arthroplasty	90% (18/20)
Venous thromboembolism prophylaxis	
Aspirin leads to less wound complications than certain methods of chemoprophylaxis against venous thromboembolic disease after total knee arthroplasty	100% (20/20)
Barbed sutures	
There appears to be a lower risk of wound complications with barbed sutures compared with interrupted closure with non-barbed sutures for total knee arthroplasty	80% (16/20)
There are significant closing time reductions with the use of barbed sutures vs interrupted closure with non-barbed sutures for total knee arthroplasty	100% (20/20)
While barbed sutures may cost more than interrupted closure with non-barbed sutures, closure with barbed sutures save costs due to faster closing times and reduced operating room time in total knee arthroplasty	85% (17/20)
There are no differences in post-operative range of motion between barbed sutures and interrupted closure with non-barbed sutures in total knee arthroplasty	95% (19/20)
There are no differences in patient-reported outcomes between barbed sutures and interrupted closure with non-barbed sutures in total knee arthroplasty	100% (20/20)
There is better cosmesis with barbed sutures versus subcuticular sutures/staples in total knee arthroplasty	90% (18/20)
Closure methods	
There are no differences in wound complication rates between staples and sutures in patients undergoing total knee arthroplasty	90% (18/20)
There are no differences in wound complications between subcuticular sutures, staples, glue, or mesh-adhesives for the closure of the skin layer in total knee arthroplasty	90% (18/20)
Patient satisfaction is similar for wound closure with subcuticular sutures versus skin glue as an adjunct or alone	95% (19/20)
Mesh-adhesive dressings	
Mesh-adhesives or staples are associated with faster closing times compared to subcuticular sutures but slower than staples in total knee arthroplasty	95% (19/20)
There may be a lower risk of wound complications with mesh-adhesive dressings versus other skin closure methods in total knee arthroplasty	80% (16/20)
Patients are more satisfied with wound closure using mesh-adhesive compared to staples in total knee arthroplasty	90% (18/20)
Closure with mesh-adhesives dressings may be associated with decreased rates of readmission compared to skin closure with staples in total knee arthroplasty	95% (19/20)
Silver-impregnated dressings	
There are decreased rates of wound complications with silver-impregnated dressings compared with standard dressings in total knee arthroplasty	85% (17/20)
Silver-impregnated dressings are associated with fewer dressing changes compared with standard dressings in total knee arthroplasty	100% (20/20)
Silver-impregnated dressings may reduce the risk of surgical site infection in total knee arthroplasty	90% (18/20)
TOTAL HIP ARTHROPLASTY	
Positioning and approaches	
There are no differences in wound complication rates between the direct anterior, posterolateral, and bikini incision direct anterior approaches for total hip arthroplasty	80% (16/20)
Drains	
The use of drains during total hip arthroplasty does not reduce the risk of wound complications	100% (20/20)
Venous thromboembolism prophylaxis	
Except for Dabigatran and Warfarin, which have higher rates of wound complications, there are no differences in rates of wound complications and infection between different venous thromboembolism chemoprophylactic methods after total hip arthroplasty	95% (19/20)
Barbed sutures	
There is not enough evidence to assess differences in wound complication rates between barbed sutures and interrupted closure with non-barbed sutures for closure of the deep fascial layer in total hip arthroplasty	100% (20/20)
There are shorter closing times with the use of barbed sutures versus interrupted closure with non-barbed sutures for the closure of the deep fascial layer in total hip arthroplasty	100% (20/20)
While barbed sutures may cost more than interrupted closure with non-barbed sutures, closure with barbed sutures may save costs due to faster closing times and reduced operating room time in total hip arthroplasty	85% (17/20)
Closure methods	
Sutures are associated with a lower risk of superficial surgical site infections compared with staples for skin closure in total hip arthroplasty	95% (19/20)
There is insufficient evidence to determine the difference in cosmesis between staples and sutures for skin closure in total hip arthroplasty	100% (20/20)
There are no differences in rates of wound complications between skin glue and other skin closure methods in total hip arthroplasty	80% (16/20)
There may be a higher patient preference for subcuticular wound closure versus staples in total hip arthroplasty	100% (20/20)
Closing time with skin staples is significantly shorter than with other skin closure methods in total hip arthroplasty	100% (20/20)
Mesh-adhesive dressings	
There may be a lower rate of wound complications with mesh-adhesives vs silver-impregnated dressings in total hip arthroplasty	80% (16/20)
There is insufficient evidence to determine if mesh-adhesive dressings lead to less wound complications than other dressings in total hip arthroplasty	95% (19/20)
Silver-impregnated dressings	
Occlusive dressings (silver-impregnated) require less frequent changes than conventional dressings in total hip arthroplasty	85% (17/20)
TOTAL KNEE AND TOTAL HIP ARTHROPLASTY	
Negative-pressure wound therapy	
In high-risk patients, there is a lower risk of wound complications with negative pressure wound therapy compared with other dressing types in total hip and total knee arthroplasty	100% (20/20)
In high-risk patients, negative pressure wound therapy is associated with lower rates of re-operation compared with other dressing types in total hip and total knee arthroplasty	95% (19/20)
In high-risk patients, negative-pressure wound therapy is associated with a reduction in dressing changes compared with other dressing types in total hip and knee arthroplasty	100% (20/20)
Triclosan-coated sutures	
Based on the available evidence, triclosan-coated sutures are likely to reduce the risk of surgical site infection in total hip and knee replacement	95% (19/20)