

Smoking and Musculoskeletal Healing

Overview

- Contemporary techniques and biologic augmentation may mitigate the adverse effects of smoking on radiographic fusion after combined TLIF and posterolateral lumbar (270°) arthrodesis [1].
- Pack-years and duration of cessation serve as independent predictors of tendon healing after arthroscopic rotator cuff repair [2].
- Surgeons should consider asking all patients with scaphoid fractures if they use smokeless tobacco or smoke to identify patients at risk for nonunions [3].
- Active smokers are at an increased risk of both medical and surgical complications in elective knee or hip arthroplasty [4].
- Heated tobacco users have worse clinical outcomes with respect to rotator cuff healing than nonsmokers, similar to conventional cigarette smokers [5].
- Smokeless tobacco use is associated with worse outcomes following total knee arthroplasty [6].
- Smoking is associated with a higher risk for complications than smokeless tobacco use [6].
- Orthopaedic surgeons should consider evaluating non-tobacco nicotine dependence within their surgical optimization protocol for total knee arthroplasty [13].
- Smokeless tobacco use is associated with increased perioperative complications and revision surgery after anterior cruciate ligament reconstruction [16].
- Smokeless tobacco use is associated with increased perioperative complications and revision surgery after anterior cruciate ligament reconstruction [17].
- Specific forms of tobacco use should be considered in preoperative screening for patients undergoing ACLR [16].
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How It Works

- Contemporary surgical techniques and biologic augmentation may mitigate the adverse effects of smoking on radiographic fusion after combined TLIF and posterolateral lumbar (270°) arthrodesis [1].
- Pack-years and duration of smoking cessation serve as independent predictors of tendon healing after arthroscopic rotator cuff repair [2].
- Surgeons should include smokeless tobacco use in patient intake history to identify patients at risk for nonunions following scaphoid fractures [3].
- Active smokers are at an increased risk of both medical and surgical complications compared to nonsmokers undergoing elective knee or hip arthroplasty [4].
- Heated tobacco users have worse clinical outcomes regarding rotator cuff healing than nonsmokers, with effects similar to conventional cigarette smokers [5].
- Smokeless tobacco use is associated with higher rates of medical- and joint-related complications following primary total hip arthroplasty [11].
- Patient factors influencing lesser tuberosity healing in stemmed and stemless anatomic shoulder arthroplasty include tobacco use and body mass index [7].
- Smoking is associated with higher residual pain and poorer functional outcomes at midterm follow-up after autologous osteochondral transplantation for osteochondral lesions of the talus [8].
- Cessation of smoking is highly advised for meniscus repair, particularly when performed in the presence of concurrent ligamentous injury [9].
- Smoking is a modifiable risk factor that should be addressed to improve outcomes and reduce costs associated with complications in patients undergoing shoulder arthroplasty [10].
- Cigarette smoking was not associated with impaired radiographic fusion after TLIF with adjunctive posterolateral arthrodesis performed using a standardized technique [12].
- All forms of tobacco products, including heated tobacco, adversely affect rotator cuff healing [14].
- Nicotine has a dose-dependent effect on bone healing, bone growth, and implant integration [18].

What the Evidence Shows

- Contemporary techniques and biologic augmentation may mitigate the adverse effects of smoking on radiographic fusion after combined TLIF and posterolateral lumbar (270°) arthrodesis [1].
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- Smokeless tobacco use is associated with worse outcomes following total knee arthroplasty [6].
- Smoking is associated with a higher risk for complications than smokeless tobacco use [6].
- Patient factors that influence tuberosity healing after stemmed and stemless anatomic shoulder arthroplasty include greater BMI and tobacco use [7].
- Smoking is associated with higher residual pain and poorer functional outcomes at midterm follow-up after autologous osteochondral transplantation for osteochondral lesions of the talus [8].
- Cessation of smoking is highly advised for meniscus repair performed in the presence of concurrent ligamentous injury to reduce factors that may contribute to failure [9].
- Smoking is a modifiable risk factor that should be addressed to improve outcomes and reduce costs associated with complications and joint replacement in patients undergoing shoulder arthroplasty [10].
- Smokeless tobacco use is associated with higher rates of medical- and joint-related complications following primary total hip arthroplasty [11].
- Cigarette smoking was not associated with impaired radiographic fusion after TLIF with adjunctive posterolateral arthrodesis performed using a standardized technique [12].
- Orthopaedic surgeons should consider evaluating non-tobacco nicotine dependence within their surgical optimization protocol for total knee arthroplasty [13].
- Heated tobacco use has a similar deleterious effect on rotator cuff repair healing as cigarette smoking [14].
- Current smokers may have poorer functional outcomes after reverse total shoulder arthroplasty compared to former smokers and nonsmokers [15].
- Smoking within 30 days of total knee arthroplasty was associated with greater postoperative pain and lower odds of achieving an acceptable pain state compared to former and never-smokers [20].
- Non-smokers were significantly more likely to achieve superior functional outcomes following ACL reconstruction compared to smokers [21].
- Current smokers and former smokers who quit smoking within 6 months of rotator cuff repair are at an elevated risk of postoperative infection and revision surgery at 90 days, 1 year, and 2 years postoperatively compared with never smokers [22].

Practical Considerations

- Contemporary techniques and biologic augmentation may mitigate the adverse effects of smoking on radiographic fusion after combined TLIF and posterolateral lumbar (270°) arthrodesis [1].
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- Surgeons should ask all patients with scaphoid fractures if they use smokeless tobacco or smoke to identify patients at risk for nonunions [3].

- Active smokers are at an increased risk of both medical and surgical complications in elective knee or hip arthroplasty [4].
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- Smokeless tobacco use is associated with worse outcomes following total knee arthroplasty [6].
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- Patient factors that influence lesser tuberosity healing in stemmed and stemless anatomic shoulder arthroplasty include greater BMI and tobacco use [7].
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- Cessation of smoking is highly advised for meniscus repair performed in the presence of concurrent ligamentous injury [9].
- Smoking is a modifiable risk factor that should be addressed to improve outcomes and reduce costs associated with complications and joint replacement in patients undergoing shoulder arthroplasty [10].
- Smokeless tobacco use is associated with higher rates of medical- and joint-related complications following primary total hip arthroplasty [11].
- Cigarette smoking was not associated with impaired radiographic fusion after TLIF with adjunctive posterolateral arthrodesis performed using a standardized technique [12].
- Orthopaedic surgeons should consider evaluating non-tobacco nicotine dependence within their surgical optimization protocol for total knee arthroplasty [13].
- Current smokers may have poorer functional outcomes after reverse total shoulder arthroplasty compared to former smokers and nonsmokers, despite no significant difference in complication or revision surgery incidence [15].
- Smokeless tobacco use is associated with increased perioperative complications and revision surgery after anterior cruciate ligament reconstruction [16].
- Smokeless tobacco use is associated with increased perioperative complications and revision surgery after anterior cruciate ligament reconstruction [17].
- Current or recent smokers may benefit from an inpatient setting of minimum 2 nights for outpatient total shoulder arthroplasty due to being an independent risk factor for complications [19].

Key Evidence

- [L3] Contemporary techniques and biologic augmentation may mitigate the adverse effects of smoking in this setting. [1] ([10.1097/corr.0000000000003999](#))
- [L3] Pack-years and duration of cessation serve as independent predictors of tendon healing. [2] ([10.1177/03635465261422620](#))

- [L3] Surgeons should consider asking all patients with scaphoid fractures if they use smokeless tobacco or smoke and consider adding this to the patient's intake history to further identify patients at risk for nonunions. [3] ([10.5435/jaaos-d-23-00188](#))
- [L1] The literature reveals that active smokers are at an increased risk of both medical and surgical complications. [4] ([10.1016/j.arth.2024.10.035](#))
- [L3] Heated tobacco users, like conventional cigarette smokers, have worse clinical outcomes with respect to rotator cuff healing than nonsmokers. [5] ([10.2106/jbjs.23.00804](#))
- [L3] However, smoking is associated with higher risk for complications than smokeless tobacco use. [6] ([10.1016/j.arth.2023.01.035](#))
- [L3] In addition to the surgical technique, patient factors that influence tuberosity healing include a greater BMI and tobacco use. [7] ([10.3390/jcm12030834](#))
- [L3] However, smoking is associated with higher residual pain and poorer functional outcomes at midterm follow-up, despite no significant differences in activity levels based on Tegner scores. [8] ([10.1186/s13018-025-06428-1](#))
- [L2] Nevertheless, MAT and meniscus repair performed in the presence of concurrent ligamentous injury require reduction of factors that may contribute to failure, and cessation of smoking is highly advised. [9] ([10.1530/eor-24-0097](#))
- [L1] Smoking is a modifiable risk factor that should be addressed to improve outcomes and reduce the costs associated with complications and joint replacement in patients undergoing shoulder arthroplasty. [10] ([10.1177/17585732251327368](#))
- [L3] Smokeless tobacco use is associated with higher rates of medical- and joint-related complications following primary THA. [11] ([10.1016/j.arth.2023.05.041](#))
- [L2] Cigarette smoking was not associated with impaired radiographic fusion after TLIF with adjunctive posterolateral arthrodesis performed using a standardized technique. [12] ([10.1097/corr.0000000000003844](#))
- [L3] Orthopaedic surgeons should consider evaluating non-tobacco nicotine dependence within their surgical optimization protocol. [13] ([10.5435/jaaos-d-23-01053](#))
- [L4] This novel study shows that heated tobacco use has a similar deleterious effect on rotator cuff repair healing as cigarette smoking. [14] ([10.2106/jbjs.24.00192](#))
- [L3] Current smokers may have poorer functional outcomes after rTSA compared to former smokers and nonsmokers, despite the incidence of complications and revision surgery not differing significantly between cohorts. [15] ([10.1016/j.jse.2024.07.052](#))
- [L3] These findings highlight the importance of considering specific forms of tobacco use in preoperative screening for patients undergoing ACLR. [16] ([10.1177/03635465241303487](#))
- [L3] These findings highlight the importance of considering specific forms of tobacco use in preoperative screening for patients undergoing ACLR. [17] ([10.1177/2325967125s00229](#))
- [L2] Nicotine has a dose-dependent effect on bone healing, bone growth, and implant integration, as demonstrated in various animal and in vitro studies. [18] ([10.1186/s13018-026-06733-3](#))

- [L3] Current or recent smokers may benefit from an inpatient setting of minimum 2 nights. [19] ([10.1016/j.jseint.2023.07.009](https://doi.org/10.1016/j.jseint.2023.07.009))
- [L3] Smoking within 30 days of TKA was associated with greater postoperative pain and lower odds of achieving an acceptable pain state compared to former and never-smokers. [20] ([10.1016/j.arth.2026.04.018](https://doi.org/10.1016/j.arth.2026.04.018))
- [L1] Nonetheless, non-smokers were significantly more likely to achieve superior functional outcomes following ACL reconstruction. [21] ([10.1002/ksa.70146](https://doi.org/10.1002/ksa.70146))
- [L3] Current smokers and former smokers who quit smoking within 6 months of rotator cuff repair are at an elevated risk of postoperative infection and revision surgery at 90 days, 1 year, and 2 years postoperatively compared with never smokers. [22] ([10.1016/j.jse.2023.03.007](https://doi.org/10.1016/j.jse.2023.03.007))

References

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jbjs.24.00192 [15] The effect of smoking on outcomes of reverse total shoulder arthroplasty. *Journal of Shoulder and Elbow Surgery*. 2025. DOI: 10.1016/j.jse.2024.07.052 [16] Association of Smokeless Tobacco Use With Perioperative Complications and Revision Surgery After Anterior Cruciate Ligament Reconstruction. *The American Journal of Sports Medicine*. 2025. DOI: 10.1177/03635465241303487 [17] Poster 132: Smokeless Tobacco Use is Associated with Increased Perioperative Complications and Revision Surgery After Anterior Cruciate Ligament Reconstruction. *Orthopaedic Journal of Sports Medicine*. 2025. DOI: 10.1177/2325967125s00229 [18] The effect of non-tobacco nicotine on bone healing: a systematic review and application to total joint arthroplasty. *Journal of Orthopaedic Surgery and Research*. 2026. DOI: 10.1186/s13018-026-06733-3 [19] Smoking is an independent risk factor for complications in outpatient total shoulder arthroplasty. *JSES International*. 2023. DOI: 10.1016/j.jseint.2023.07.009 [20] Impact of Smoking Status on Early Outcomes and Healthcare Utilization Following Primary Total Knee Arthroplasty: A Retrospective Cohort Study. *The Journal of Arthroplasty*. 2026. DOI: 10.1016/j.arth.2026.04.018 [21] Tobacco's toll: Comparable anterior cruciate ligament graft failure rates and inferior functional outcomes in smokers compared to non-smokers: A systematic review and meta-analysis. *Knee Surgery, Sports Traumatology, Arthroscopy*. 2025. DOI: 10.1002/ksa.70146 [22] Does timing matter? The effect of preoperative smoking cessation on the risk of infection or revision following rotator cuff repair. *Journal of Shoulder and Elbow Surgery*. 2023. DOI: 10.1016/j.jse.2023.03.007