

Management of Hormonal Contraceptives During the Perioperative Period for Anterior Cruciate Ligament Reconstruction



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Introduction

- Venous thromboembolism (VTE) is a rare, but potentially serious complication after anterior cruciate ligament reconstruction (ACLR).^{1,2,3}
- Rates of deep vein thrombosis (DVT) have been reported between .25%-17.9% and rates of pulmonary embolism (PE) between .05-.17%.^{4,5,6,7,8}
- The use of OCPs is a known risk factor for thromboembolic events and, in ACL reconstruction, increases the risk for such an event beyond the risk presented by surgery and rehabilitation alone.⁸
- Though evidence has not supported routine use of chemoprophylaxis post-operatively, there are no clear guidelines for treatment of higher risk individuals, such as patients using hormonal contraceptives.^{9,10}
- This is an area of high clinical intersection due to increased ACLRs young, female patients – a demographic with high rates of hormonal contraceptive use



Hormonal contraceptives

- Comparisons by route lacking, but oral contraceptives perceived to be highest risk
 - Inference from comparisons of oral and transdermal HRT medications
- **Combined Oral Contraceptive Use Increases the Risk of Venous Thromboembolism After Knee Arthroscopy and Anterior Cruciate Ligament Reconstruction: An Analysis of 64,165 Patients in the Truven Database** (Traven et al Arthroscopy 2021)
 - Patients on OCPs 2X as likely to have a DVT or PE
 - If also obese or smoker 4X
- Routes
 - Oral
 - Transdermal (Ortho Evra or Xulane patch)
 - Vaginal
 - Mirena IUD is progesterone only and NOT a risk
 - Vaginal ring: Nuvoring contains estrogen (placed monthly)



Purpose and Hypothesis

- Purpose:
 - to evaluate the management practices of surgeons performing ACLR in female patients using hormonal contraceptives
- Hypothesis:
 - There is not a standard of care among surgeons
 - Some surgeons change their management based on the presence of this risk factor and counsel patients on the risk of VTE associated with the use of hormonal contraceptives and surgery



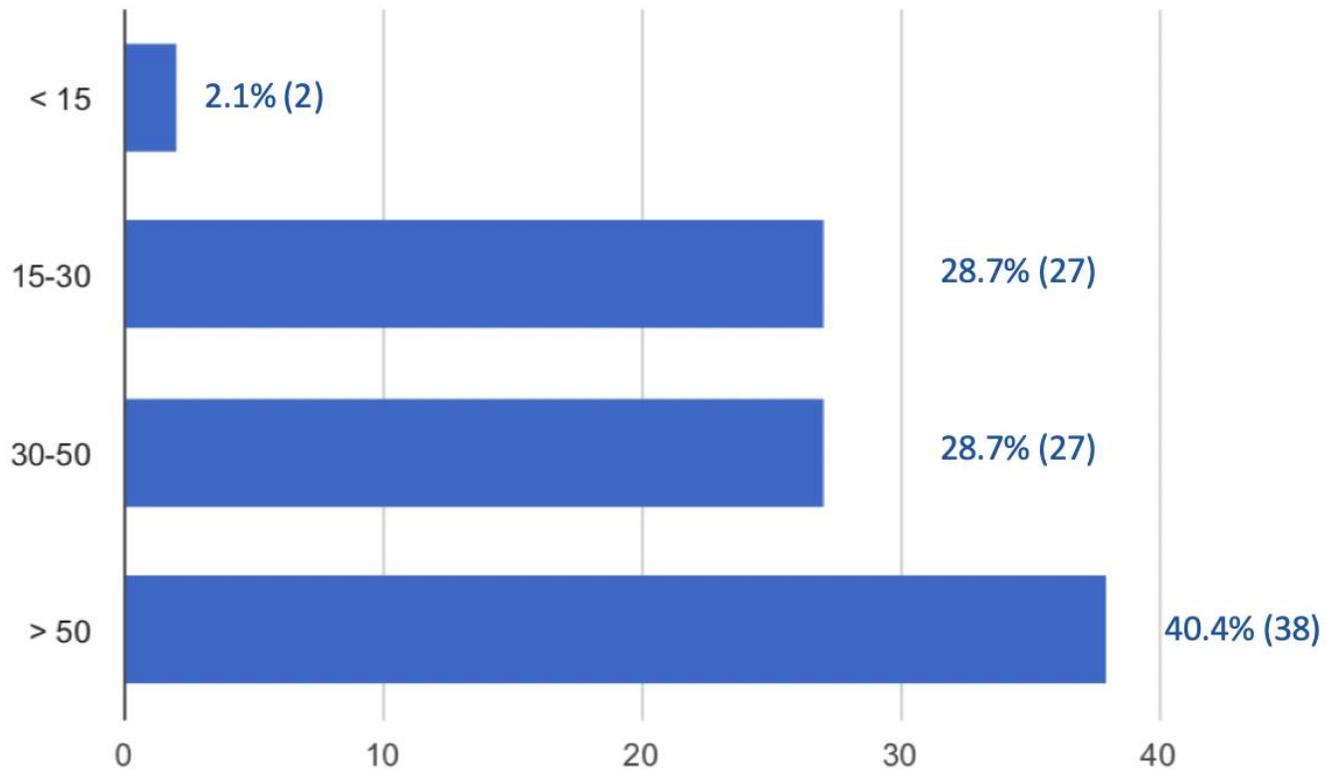
Methods

- Study Design:
 - Cross-sectional study; survey-based.
- Methods:
 - Survey utilizing branching logic was created by our research team, IRB approved, and approved for distribution by Arthroscopy Association of North America's (AANA) Research Committee.
 - Designed to identify the respondent's clinical decision-making regarding:
 - the use of VTE prophylaxis following ACLR in patients without risk factors for VTE
 - their counseling to patients about the risk of VTE associated with hormonal contraceptive use during the perioperative period
 - their use of VTE prophylaxis following ACLR in patients taking hormonal contraceptives and does it vary by type of hormonal contraception



Results

- 94 respondents (63% Male, 37% Female)
- Practice type: 40% academic, 33% private, 23% hospital-employed, 1% military, 3% other.
- ACLR's performed annually by Respondents





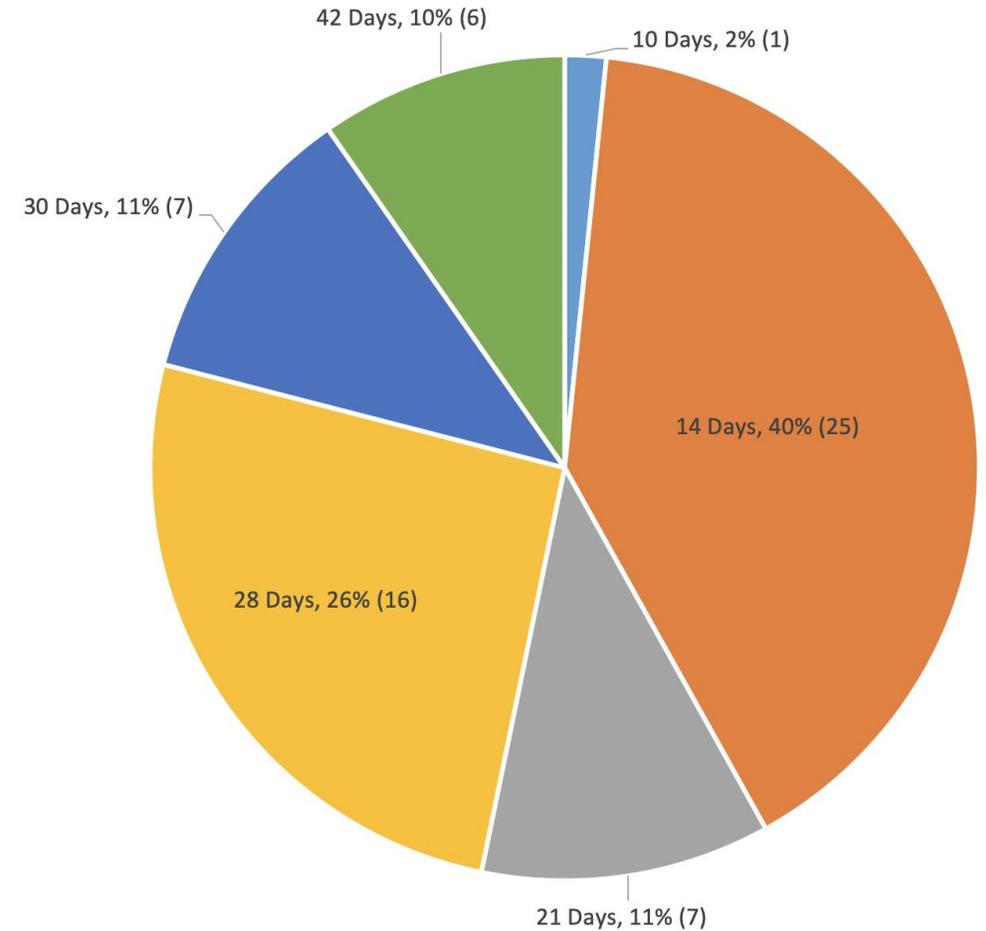
Results

- 67% routinely use pharmacologic VTE prophylaxis
- Reason for using pharmacologic VTE prophylaxis
 - 98% reported to reduce risk of DVT/PE
 - 37% reported Medical-Legal Concerns
- VTE Prophylaxis Regimens after ACLR
 - 97% (60/62) of these providers used an Aspirin-based regimen
 - 61% (38/62) use Aspirin 325mg
 - 35% (22/62) use Aspirin 81mg
 - 1 provider used Naproxen 500mg
 - 1 provider used Eliquis 5mg
- Most common VTE combined regimen: 325mg Aspirin daily for 14 days (15%, 9/62 providers)



Results

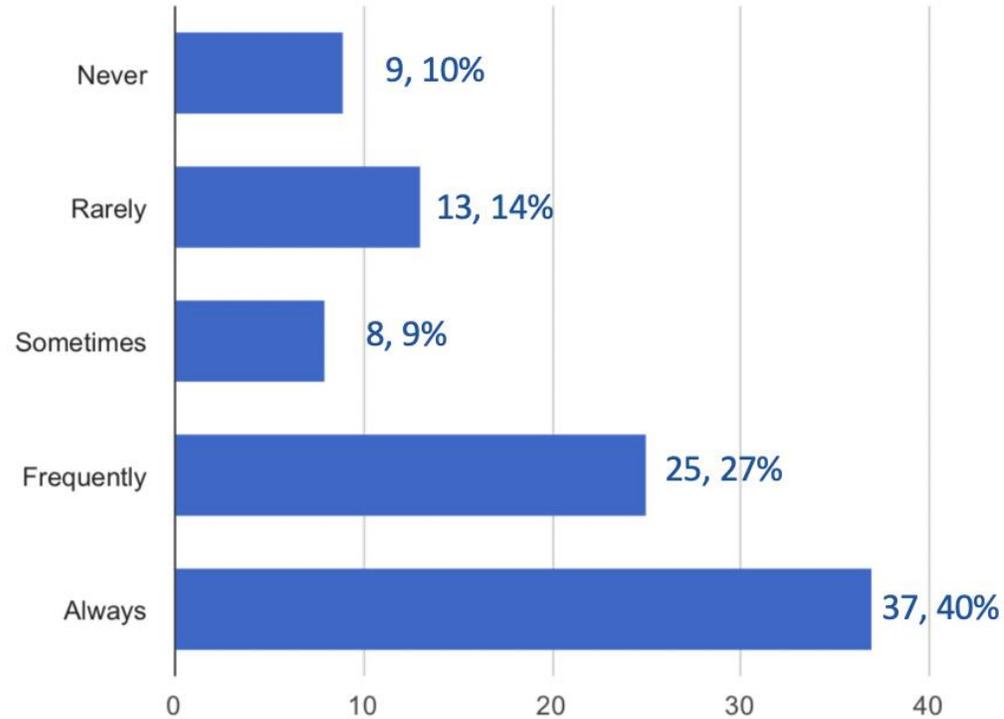
- Duration of pharmacologic VTE prophylaxis:
 - Most common duration is 14 days, 40% (25/62)
 - 98% providers prescribe at least 14 days (61/62)
 - 58% providers prescribe at least 21 days (36/62)
 - 47% providers prescribe at least 28 days (29/62)





Results

- 67% have had a patient with VTE after ACLR (32% male pt, 24% female pt, 33% both male and female patients)
- How often do surgeons ask female patients about hormonal contraceptive medications?





Results

- Does use of hormonal contraceptives change your care plan in female patients undergoing ACLR?
 - 55% (51 respondents) – No
 - 12% (11) – Depends on the type of hormonal contraceptive
 - 33% (30) – Yes, but I change my care plan in the same way regardless of type of hormonal contraceptive
- Of those that responded yes, how do you change your care plan?
 - 30% (9) - ask patient to stop hormonal birth control perioperatively
 - 37% (11) - prescribe pharmacologic prophylaxis even though I do NOT do so routinely after ACLR
 - 7% (2) - increase dose of routine pharmacologic prophylaxis
 - 10% (3) - increase duration of routine pharmacologic prophylaxis
 - 23% (7) - use different pharmacologic prophylaxis



Results

- Why might you not ask your patient about the use of hormonal birth control?
 - 67% (37) – Does not change my treatment
 - 15% (8) – Risk of blood clots associated with use of hormonal contraceptives is low
 - 18% (10) – I adjust my perioperative prophylaxis based on medications listed in medical record
 - 6% (3) – Avoid an uncomfortable subject
 - 9% (5) – Parents of minor present
 - 2% (1) – I don't think the patient would have a reason to be on hormonal contraceptives



Results- “it depends on type”

Respondents who reported type of hormonal contraception affects change in care plan

- more likely to ask a patient to stop oral contraceptive pills (OCPs) than remove a transdermal patch or vaginal ring
- more likely to prescribe pharmacologic prophylaxis even though I do NOT do so routinely after ACLR with OCPs than transdermal patch or vaginal ring

How does the use of oral contraceptive pills (OCPs) change your care plan?

- 36% - ask patient to stop taking OCPs perioperatively
- 27% - prescribe pharmacologic prophylaxis even though I do NOT do so routinely after ACLR
- 9% - increase dose of routine pharmacologic prophylaxis
- 9% - increase duration of routine pharmacologic prophylaxis
- 18% - use different pharmacologic prophylaxis

How does the use of hormonal vaginal ring contraceptives change your care plan?

- 27% - ask patient to remove the ring perioperatively
- 18% - prescribe pharmacologic prophylaxis even though I do NOT do so routinely after ACLR
- 0% - increase dose of routine pharmacologic prophylaxis
- 9% - increase duration of routine pharmacologic prophylaxis
- 18% - use different pharmacologic prophylaxis

How does the use of transdermal hormonal contraceptives change your care plan?

- 27% - ask patient to remove the transdermal patch perioperatively
- 18% - prescribe pharmacologic prophylaxis even though I do NOT do so routinely after ACLR
- 9% - increase dose of routine pharmacologic prophylaxis
- 9% - increase duration of routine pharmacologic prophylaxis
- 18% - use different pharmacologic prophylaxis



Results

- Female surgeons were 4.2x more likely to ask about hormonal contraceptive use than male surgeons ($p=0.01$)
- Female surgeons were 2.8x more likely to change their VTE prophylaxis plan as a result of use of hormonal contraceptives ($p=0.02$)
- Surgeons that have had a female patient with VTE after ACLR are 2.9x more likely to ask about hormonal contraceptive medications ($p=0.03$)
- Surgeons that have had a female patient with VTE after ACLR are 4.6x more likely to change their VTE prophylaxis plan as a result of the use of hormonal contraceptive medications ($p=0.001$)



Discussion and Conclusions

- There is no clear standard of care for VTE prophylaxis after ACLR.
- A surgeon's gender and prior clinical experience may influence their likelihood to consider a patient's hormonal contraceptive use with regard to VTE risk after ACLR
- Future research is needed to determine which patients of increased VTE risk would benefit from altered post-operative VTE prophylaxis and the optimal regimen for these patients including withholding hormonal contraceptives perioperatively



References

1. Bourget-Murray J, Clarke MA, Gorzitza S, Phillips LA. Symptomatic bilateral pulmonary embolism without deep venous thrombosis in an adolescent following arthroscopic anterior cruciate ligament reconstruction: a case report and review of the literature. *J Med Case Rep*. 2018;12(1):194. Epub 2018/07/07. doi: 10.1186/s13256-018-1726-8. PubMed PMID: 29976241; PMCID: PMC6034342.
2. Gaskill T, Pullen M, Bryant B, Sicignano N, Evans AM, DeMaio M. The Prevalence of Symptomatic Deep Venous Thrombosis and Pulmonary Embolism After Anterior Cruciate Ligament Reconstruction. *Am J Sports Med*. 2015;43(11):2714-9. Epub 2015/09/24. doi: 10.1177/0363546515601970. PubMed PMID: 26391861.
3. Janssen RP, Sala HA. Fatal pulmonary embolism after anterior cruciate ligament reconstruction. *Am J Sports Med*. 2007;35(6):1000-2. Epub 2007/02/20. doi: 10.1177/0363546506298581. PubMed PMID: 17307895.
4. Abram SGF, Judge A, Beard DJ, Price AJ. Rates of Adverse Outcomes and Revision Surgery After Anterior Cruciate Ligament Reconstruction: A Study of 104,255 Procedures Using the National Hospital Episode Statistics Database for England, UK. *Am J Sports Med*. 2019;47(11):2533-42. Epub 2019/07/28. doi: 10.1177/0363546519861393. PubMed PMID: 31348862.
5. Ilahi OA, Reddy J, Ahmad I. Deep venous thrombosis after knee arthroscopy: a meta-analysis. *Arthroscopy*. 2005;21(6):727-30. Epub 2005/06/10. doi: 10.1016/j.arthro.2005.03.007. PubMed PMID: 15944631.
6. Mauck KF, Froehling DA, Daniels PR, Dahm DL, Ashrani AA, Crusan DJ, Petterson TM, Bailey KR, Heit JA. Incidence of venous thromboembolism after elective knee arthroscopic surgery: a historical cohort study. *J Thromb Haemost*. 2013;11(7):1279-86. Epub 2013/05/08. doi: 10.1111/jth.12283. PubMed PMID: 23648016; PMCID: PMC3827585.
7. Kraus Schmitz J, Lindgren V, Janarv PM, Forssblad M, Stalman A. Deep venous thrombosis and pulmonary embolism after anterior cruciate ligament reconstruction: incidence, outcome, and risk factors. *Bone Joint J*. 2019;101-b(1):34-40. Epub 2019/01/03. doi: 10.1302/0301-620x.101b1.Bjj-2018-0646.R1. PubMed PMID: 30601041.
8. Maletis GB, Inacio MC, Reynolds S, Funahashi TT. Incidence of symptomatic venous thromboembolism after elective knee arthroscopy. *J Bone Joint Surg Am*. 2012;94(8):714-20. Epub 2012/04/21. doi: 10.2106/jbjs.J.01759. PubMed PMID: 22517387.
9. van Adrichem RA, Nemeth B, Algra A, et al. Thromboprophylaxis after knee arthroscopy and lower-leg casting. *N Engl J Med* 2017;376:515–525.
10. Falck-Ytter Y, Francis CW, Johanson NA, et al. Prevention of VTE in orthopedic surgery patients: antithrombotic therapy and prevention of thrombosis, 9th ed: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest*. 2012;141(2)(suppl):e278S-e325S.