

## DAFTAR PUSTAKA

1. Ahlden, Mattias; Kartus, Juri; Ejerhed, Lars; Karlsson, Jon; Sernert N. Knee laxity measurements after anterior cruciate ligament reconstruction , using either bone – patellar – tendon – bone or hamstring tendon autografts , with special emphasis on comparison over time. *Knee Surg Sport Traumatol Arthrosc.* 2009;17:1117-1124. doi:10.1007/s00167-009-0846-5
2. Angoules AG, Balakatounis K, Boutsikari EC, Mastrokalos D, Papagelopoulos PJ. Anterior-Posterior Instability of the Knee Following ACL Reconstruction with Bone-Patellar Tendon-Bone Ligament in Comparison with Four-Strand Hamstrings Autograft. *Rehabil Res Pract.* 2013;2013.
3. Mahapatra P, Horriat S, Anand BS. Anterior cruciate ligament repair – past, present and future. *J Exp Orthop.* 2018;5(1). doi:10.1186/s40634-018-0136-6
4. Pauzenberger L, Syré S, Schurz M. “ Ligamentization ” in Hamstring Tendon Grafts After Anterior Cruciate Ligament Reconstruction : A Systematic Review of the Literature and a Glimpse Into the Future. *Arthrosc J Arthrosc Relat Surg.* 2013;29(10):1712-1721. doi:10.1016/j.arthro.2013.05.009
5. Lord B, Grice J. ( iii ) Anterior cruciate ligament reconstruction e evolution and current concepts. *Orthop Trauma.* 2014;29(1):12-23. doi:10.1016/j.mporth.2014.12.002
6. Bourke HE, Gordon DJ, Salmon LJ, Waller A, Linklater J, Sydney FN. The outcome at 15 years of endoscopic anterior cruciate ligament reconstruction using hamstring tendon autograft for ‘ isolated ’ anterior cruciate ligament rupture. :630-637. doi:10.1302/0301-620X.94B5.28675
7. Vorlat, P; Verdonk, R; Arnauw G. Long-term results of tendon allografts for anterior cruciate ligament replacement in revision surgery and in cases of combined complex injuries. *Knee Surg, Sport Traumatol, Arthrosc.*

1999;7:318-322.

8. Sadoni H, Moosavi SS, Ghasemi MA. Examining the Effect of Anterior Drawer and Lachman Test on Lysholm Score in Patients with Anterior Cruciate Ligament Reconstruction Using Hamstring Tendon. *Asian J Pharm.* 2017;11(4):873-876.
9. Kartus J, Jerre R, Eriksson BI, Karlsson J, Brandsson S, Faxe E. A prospective four- to seven-year follow-up after arthroscopic anterior cruciate ligament reconstruction. 2001;112:23-27.
10. Kim HS, Seon JK, Jo AR. Current Trends in Anterior Cruciate Ligament Reconstruction. *Knee Surg Relat Res.* 2013;25(4):165-173.
11. Akhtar MA, Bhattacharya R, Keating JF. The Knee Generalised ligamentous laxity and revision ACL surgery: Is there a relation? *Knee.* 2015. doi:10.1016/j.knee.2015.11.006
12. Abulhasan JF, Grey MJ. Anatomy and physiology of knee stability. *J Funct Morphol Kinesiol.* 2017;2(4). doi:10.3390/jfmk2040034
13. van der Esch M, de Zwart A, Pijnappels M, et al. Falls associated with knee instability in people with knee osteoarthritis: biomechanical risk factors and pain. *Osteoarthr Cartil.* 2014;22(2014):S432. doi:10.1016/j.joca.2014.02.814
14. Bauer M, Feeley BT, Wawrzyniak JR, Pinkowsky G, Gallo RA. Factors affecting return to play after anterior cruciate ligament reconstruction: A review of the current literature. *Phys Sportsmed.* 2014;42(4):71-79. doi:10.3810/psm.2014.11.2093
15. Greene WB. *Netter's Orthopaedics*. 1st Editio. (Greene WB, ed.). Saunders Elseviers; 2006.
16. Sivananthan S, Sherry E, Warnke P, Miller MD. *Mercer's Textbook of Orthopaedics and Trauma*. 10th Editi. London: Hodder Arnold; 2012. doi:978 0 340 942 031
17. Thompson JC. *Netter's Concise Orthopaedic Anatomy*. Second Edi. (Thompson JC, ed.). Philadelphia: Saunders Elseviers; 2010.
18. Gollehon DL, Torzilli PA, Warren RF. The role of the posterolateral and

- cruciate ligaments in the stability of the human knee. A biomechanical study. *J Bone Jt Surg - Ser A*. 1987;69(2):233-242. doi:10.2106/00004623-198769020-00010
19. Laprade RF, Wentorf F. Diagnosis and Treatment of posterolateral injuries.pdf. 2002;(402):110-121. doi:10.1097/01.blo.0000026222.49620.4d
  20. Rossi R, Dettoni F, Bruzzone M, Cottino U, D'Elicio DG, Bonasia DE. Clinical examination of the knee: Know your tools for diagnosis of knee injuries. *Sport Med Arthrosc Rehabil Ther Technol*. 2011;3(1):1-10. doi:10.1186/1758-2555-3-25
  21. Logerstedt DS, Scalzitti D, Risberg MA, et al. Knee stability and movement coordination impairments: Knee ligament sprain revision 2017. *J Orthop Sports Phys Ther*. 2017;47(11):A1-A47. doi:10.2519/jospt.2017.0303
  22. Abulhasan JF, Snow MD, Anley CM, Bakhsh MM, Grey MJ. An extensive evaluation of different knee stability assessment measures: A systematic review. *J Funct Morphol Kinesiol*. 2016;1(2):209-229. doi:10.3390/jfmk1020209
  23. Johnson D. *ACL Made Simple*. Vol 53.; 2013. doi:10.1017/CBO9781107415324.004
  24. Prodromos C, Brown C, Fu F, et al. *The Anterior Cruciate Ligament: Reconstruction and Basic Science*. First Edit. Saunders Elseviers; 2007.
  25. Colombet P, Jenny JY, Menetrey J, Plaweski S, Zaffagnini S. Current concept in rotational laxity control and evaluation in ACL reconstruction. *Orthop Traumatol Surg Res*. 2012;98(8 SUPPL):S201-S210. doi:10.1016/j.otsr.2012.10.005
  26. Sandberg R, Balkfors B, Henricson A, Westlin N. Stability tests in knee ligament injuries. *Arch Orthop Trauma Surg*. 1986;106(1):5-7. doi:10.1007/BF00435642
  27. Gans I, Retzky JS, Jones LC, Tanaka MJ. Epidemiology of Recurrent Anterior Cruciate Ligament Injuries in National Collegiate Athletic

- Association Sports: The Injury Surveillance Program, 2004-2014. *Orthop J Sport Med.* 2018;6(6):1-7. doi:10.1177/2325967118777823
28. Hootman JM, Dick R, Agel J. Epidemiology of collegiate injuries for 15 sports: Summary and recommendations for injury prevention initiatives. *J Athl Train.* 2007;42(2):311-319.
  29. Greenberg EM, Greenberg ET, Albaugh J, Storey E, Ganley TJ. Anterior Cruciate Ligament Reconstruction Rehabilitation Clinical Practice Patterns: A Survey of the PRiSM Society. *Orthop J Sport Med.* 2019;7(4):1-14. doi:10.1177/2325967119839041
  30. Monk A, Davies L, Hopewell S, Harris K, Beard D, Price A. Surgical versus conservative interventions for treating anterior cruciate ligament injuries (Review). *Cochrane Database Syst Rev.* 2016;(4):CD011166. doi:10.1002/14651858.CD011166.pub2.www.cochranelibrary.com
  31. Ellison AE, Berg E. Embryology, Anatomy, and Function of the Anterior Cruciate Ligament. *Orthop Clin North Am.* 1985;16(1):3-14.
  32. Lang PJ, Sugimoto D, Micheli LJ. Prevention, treatment, and rehabilitation of anterior cruciate ligament injuries in children. *Open Access J Sport Med.* 2017;Volume 8:133-141. doi:10.2147/oajsm.s133940
  33. Padua DA, DiStefano LJ, Beutler AI, De La Motte SJ, DiStefano MJ, Marshall SW. The landing error scoring system as a screening tool for an anterior cruciate ligament injury-prevention program in elite-youth soccer athletes. *J Athl Train.* 2015;50(6):589-595. doi:10.4085/1062-6050-50.1.10
  34. Hewett TE, Myer GD, Ford KR, et al. Biomechanical measures of neuromuscular control and valgus loading of the knee predict anterior cruciate ligament injury risk in female athletes: A prospective study. *Am J Sports Med.* 2005;33(4):492-501. doi:10.1177/0363546504269591
  35. Bach BR, Provencher MT. *ACL Surgery: How To Get It Right the First Time and What To Do If It Fails.* 1st editio. SLACK Incorporated; 2010.
  36. Boutsiadis A, Panisset J, Devitt BM, Barthelemy R, Barth J. AnteriorLaxity at 2 Years After Anterior Cruciate Ligament Reconstruction Is Comparable When Using Adjustable-Loop Suspensory Fixation and

- Interference Screw Fixation. *Am J Sports Med.* 2018;1-10. doi:10.1177/0363546518784005
37. Noh JH, Nam WD, Roh YH. Anterior tibial displacement on preoperative stress radiography of ACL-injured knee depending on knee flexion angle. *Knee Surg Relat Res.* 2019;31(1):1-6. doi:10.1186/s43019-019-0014-2
  38. Highgenboten CL, Jackson AW, Jansson KA, Meske NB. KT-1000 arthrometer: Conscious and unconscious test results using 15, 20, and 30 pounds of force. *Am J Sports Med.* 1992;20(4):450-454. doi:10.1177/036354659202000415
  39. Hyeon J, Jong Y, Seon K, Kwan Y. Anterior translation and rotational stability of anterior cruciate ligament - deficient knees during walking : speed and turning direction. *J Orthop Sci.* 2014. doi:10.1007/s00776-014- 0672-6
  40. Prodromos CC, Joyce BT, Shi K, Keller BL. A Meta-Analysis of Stability After Anterior Cruciate Ligament Tendon Graft and Fixation Type. *Arthrosc J Arthrosc Relat Surg.* 2005;21(10):1202.e1-1202.e9. doi:10.1016/j.arthro.2005.08.036
  41. Abramowitch SD, Papageorgiou CD, Withrow JD, Gilbert TW, Woo SLY. The effect of initial graft tension on the biomechanical properties of a healing ACL replacement graft: A study in goats. *J Orthop Res.* 2003;21(4):708-715. doi:10.1016/S0736-0266(02)00265-6
  42. Getgood A, Spalding T. The Evolution of Anatomic Anterior Cruciate Ligament Reconstruction. *Open Orthop J.* 2012;6(1):287-294. doi:10.2174/1874325001206010287

## LAMPIRAN

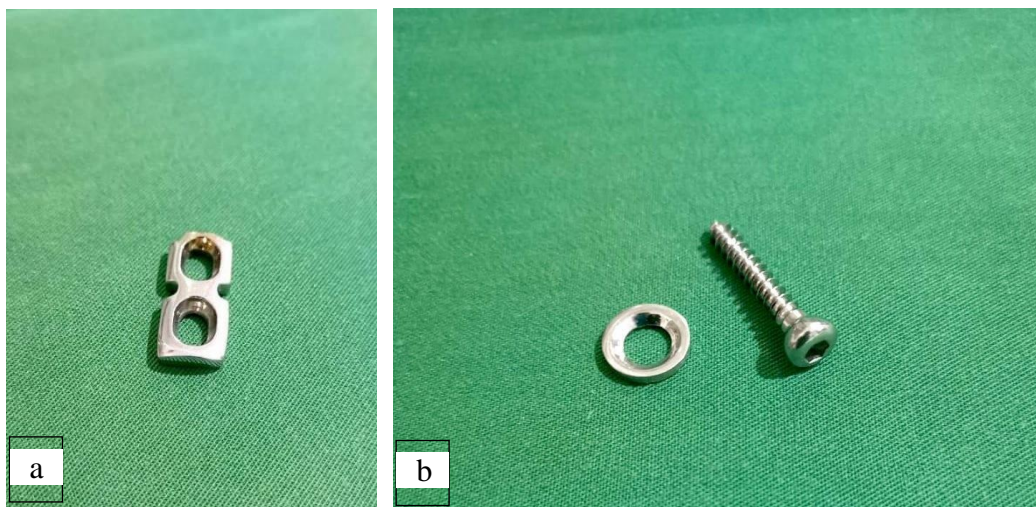
### Lampiran 1. Implan pabrikan



Gambar 8. Implan pabrikan

- a. *Endobutton* sebagai fiksasi graft pada tulang femur
- b. *Interference screw* sebagai fiksasi pada tulang tibia

### Lampiran 2. Implan modifikasi



Gambar 9. Implan modifikasi

- a. *Reconstruction plate* 4,5mm yang telah dipotong menjadi ukuran 2 hole, menggantikan fungsi *endobutton*
- b. *Washer* 4,5mm dan *cortical screw* 4,5mmx20mm, menggantikan fungsi *interference screw*

**Lampiran 3. Artroskopi rekonstruksi ACL menggunakan graf tendon semitendinosus dan fiksasi modifikasi**



Gambar 10. Operasi dengan menggunakan implan modifikasi

- a. Preparasi graf tendon semitendinosus
- b. Implan modifikasi *reconstruction plate* 4,5mm dipasang sebagai fiksasi pada femur
- c. Implan modifikasi *cortical screw* dan *washer* 4,5mm terpasang pada tibia

Lampiran 4. Pengukuran *generalized laxity* dan translasi anterior-posterior



Gambar 11. Pengukuran translasi anterior-posterior

a-c. Pengukuran translasi anterior-posterior pre operasi

d-h. Pengukuran *generalized laxity* dengan menggunakan *Beighton score*

i-j. Pengukuran translasi anterior-posterior pasca operasi



## Lampiran 5. Data penelitian

MODIFIED IMPLANT										
KODE PASIEN	JK	USIA (THN)	PREOP		POSTOP					
			ANTERIOR TRANSLATION (mm)		ANTERIOR TRANSLATION (mm)			LYSHOLM SCORE		
			SISI CEDERA	SISI KONTROL	BLN-3	BLN-6	BLN-12	BLN-3	BLN-6	BLN-12
M1	L	18	4,93	0,33	2,10	2,63	1,93	66	88	90
M2	P	30	7,63	0,17	1,37	2,87	1,77	90	100	100
M3	L	31	6,03	1,33	2,07	2,87	1,67	87	100	100
M4	P	20	5,30	0,43	1,57	3,13	2,20	86	100	100
M5	P	33	4,07	0,27	2,30	2,77	1,83	86	100	100
M6	P	47	3,90	0,33	1,93	3,10	1,90	82	90	90
M7	L	19	5,67	1,10	1,43	3,90	2,10	86	100	100
M8	L	32	5,87	0,77	2,60	2,93	1,83	95	95	95
M9	L	41	3,90	0,57	1,13	3,07	1,83	100	100	100
M10	L	52	5,13	0,93	2,03	2,70	2,20	65	88	100
M11	L	45	6,43	1,07	2,13	2,73	1,83	70	91	96
M12	L	31	4,37	0,77	2,67	2,23	1,97	80	96	96
M13	P	30	5,70	0,93	2,30	2,87	1,83	85	100	100
M14	L	42	8,83	0,60	3,23	2,97	1,87	88	95	95
M15	L	28	4,47	1,07	2,97	2,90	1,87	86	100	100
M16	L	19	6,27	0,47	1,47	2,97	1,97	86	100	100
M17	L	28	4,60	0,73	1,33	2,83	1,77	95	95	95
M18	P	18	4,87	0,40	1,83	2,50	2,03	90	100	100
M19	P	48	5,37	0,27	1,93	3,17	1,90	65	88	100
M20	L	34	7,03	0,17	2,27	3,20	2,10	86	100	100
M21	L	19	5,67	0,27	1,50	3,07	2,10	86	100	100
M22	L	22	6,77	0,63	1,47	2,70	2,20	65	88	100
M23	L	28	5,87	1,10	1,43	3,90	2,53	85	100	100
M24	L	23	2,53	1,23	2,13	2,63	1,80	88	95	95
M25	L	26	4,60	0,67	2,43	2,80	1,83	86	88	94
M26	L	32	5,67	0,27	1,50	3,07	2,10	86	100	100
M27	L	22	6,43	0,37	2,13	2,87	2,13	85	100	100
M28	P	17	5,03	0,27	2,37	2,80	1,93	79	95	95
M29	L	41	5,67	0,27	1,50	3,07	2,10	86	100	100
M30	L	25	4,60	0,67	2,43	2,80	1,83	86	88	94
M31	L	18	4,63	0,27	1,83	2,50	1,67	65	88	100
M32	L	16	4,60	0,73	1,33	2,83	1,77	95	95	95
$\bar{X}$		30,296	5,39	0,61	1,96	2,92	1,95	83,31	95,72	97,81

STANDARD IMPLANT										
KODE PASIEN	JK	USIA (THN)	PREOP		POSTOP					
			ANTERIOR TRANSLATION		ANTERIOR TRANSLATION (mm)			LYSHOLM SCORE		
			SISI CEDERA	SISI KONTROL	BLN-3	BLN-6	BLN-12	BLN-3	BLN-6	BLN-12
S1	L	18	6,43	0,17	1,60	2,40	1,73	72	91	96
S2	L	19	6,60	0,60	2,97	2,90	2,03	82	95	95
S3	L	27	5,43	0,20	1,37	3,07	1,80	86	100	100
S4	L	36	5,70	0,93	2,30	3,90	1,97	85	100	100
S5	L	33	7,00	0,57	1,77	2,87	1,90	82	90	90
S6	L	16	5,83	0,73	1,27	3,90	2,13	89	96	100
S7	L	40	6,77	0,27	1,43	2,80	2,03	79	95	95
S8	P	19	4,63	0,27	1,83	2,50	1,67	65	88	100
S9	L	21	5,37	0,27	1,93	3,17	1,90	65	88	100
S10	L	51	5,87	1,10	1,43	3,90	2,53	76	88	92
S11	L	27	6,23	0,40	1,67	2,93	1,83	70	91	96
S12	L	27	4,93	0,57	2,97	2,63	1,77	95	100	100
$\bar{X}$		28,909	5,90	0,51	1,88	3,08	1,94	79,45	93,73	97,09