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## Checklist for Better and Simply Register: Bandung Knee Orthopaedic Sport Checklist

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#### Abstract

Background: There were various complaints may present in the sports orthopedics clinic with different etiologies and treatment plans. To simplify the identification, diagnosis, and evaluation of knee joint complaints, a checklist form was developed. It is intended to be used in sports orthopedics for registration of patients with knee joint complaints. This study aimed to develop a checklist in sports orthopedics for registration of patients with knee joint complaints to simplify the identification, diagnosis, and evaluation of knee joint complaints. Methods: This was a qualitative study conducted at Dr. Hasan Sadikin General Hospital from April to May 2020. There were three aspects considered which include physical aspects, anatomical aspects and content aspects. This form was developed through existing medical records and brainstorming of consultants. Results: The form consisted of several sections which include history of disease, physical examination, MRI findings, treatment plans, postoperative rehabilitation and evaluation. History of the disease consisted of the chief complaints, etiology and onset. Physical examination includes the examinations to assess ligament laxity. Treatment plans were divided into conservative and operative. Operative treatment was further elaborated into technique, graft and implant type, and findings during the operation. Rehabilitation was including the use of crutches, knee braces and the type of physiotherapy that the patient must undergo. And lastly were postoperative complaints. Conclusions: The registration form is developed with the intention of creating a uniformed format of report thus simplifying and make ease of future evaluations by every consultant. Therefore, these checklists can be used for any orthopaedic consultant.

Keywords: Checklist, Knee, Orthopaedic, Sport Medicine

#### 1. Introduction

The knee joint is the largest and most superficial joint. Stability of the knee joint requires the integration of a complex set of anatomical structures (Abulhasan et al., 2017). In addition to the surrounding muscles, passive stabilizers such as ligaments, menisci and joint capsule plays a crucial role (Moore et al., 2014; Majewski et al., 2006). Movements such as running and jumping, can cause the force on the knees reach up to 10 times the body weight (Akhtaruzzaman et al., 2019). Sudden change of direction, contact of participants which are commonly

involved in sports often times cause injury to various structures of the knee such as anterior cruciate ligament tear, posterior cruciate ligament tear, meniscal injury, etc (Nicolini et al., 2014; Hewett et al., 2016). Thirty two point six percent of all sports injury occur in the knee with 20-25% of the knee injuries occur while performing sports. It is also stated that in knee injuries like ACL rupture, there is a risk of recurrence about 11% (Gans et al., 2018). In a 10 year study, 6434 patients (37%) had 7769 injuries (39.8%) related to the knee joint which shows the possibility of multiple injuries (Majewski et al., 2006).

The treatment approach for knee sport injury depends on the type injury (Moatsche et al., 2017). A few components should be assessed before deciding the treatment. For example, ligament laxity. People with high-grade preoperative laxity that undergone ACL reconstruction have double the risk of a revision surgery (Magnussen et al., 2016). Skeletal maturity should also be considered because it influences quadriceps strength that can help predict the self-reported functional outcome after ACL surgery (Casp et al., 2021; Pietrosimone et al., 2016). Treatment maybe conservative or operative, although it is still unclear which treatment yield better results (Krause et al., 2018; van Yperen et al., 2018; Monk et al., 2016). Then the patient needs a continuous follow-up to assess the postoperative complaints and function of the knee. The whole process of assessment, diagnosis, treatment, and evaluation is a long continual process. The body of a manuscript opens with an introduction that presents the specific problem under study and describes the research strategy. Because the introduction is clearly identified by its position in the manuscript, it does not carry a heading labeling it the introduction. treatment and can be used as a tool to evaluate patients. However, conventional medical records are wordy and may be overwhelming to read for a long continual treatment process. The characteristic of the writing format of each consultant may be different from one another, thus making it troublesome to review, especially for multiple injuries, at a later time for other consultants (Majewski et al., 2006).

Thus, we develop a checklist form that includes the patient's identity, assessment, diagnosis, treatment, and evaluation with the intention of simplifying the overall process and generalizing the format of assessment to evaluate and facilitating periodic evaluation. This form is intended to be an additional form instead of a replacement for the existing medical record. This study aimed to develop a checklist in sports orthopedics for the registration of patients with knee joint complaints to simplify the identification, diagnosis, and evaluation of knee joint complaints.

#### 2. Method

This was a qualitative study conducted at Dr. Hasan Sadikin General Hospital from April to May 2020. There were three aspects considered which include physical aspects, anatomical aspects, and content aspects. The data collection process was obtained through observation and brainstorming by the knee orthopedic sport consultants. Based on the discussion, expertise, and experiences of knee orthopedic sports consultants, we considered the aspects that needed to be included in the form. Brainstorming was performed to meet the consultant's requirements and agreement so that any consultant can uniformly and efficiently use the form. This study was conducted ethically and did not involve human subjects or patients' data.

#### 3. Results

#### 3.1 Physical Aspects

The form was intended to be printed and filled in through handwriting. Conventional medical record and other forms which are available in the clinic were white, 80-gram A4 papers, and text were printed in black ink. The consultants agreed to have the same physical aspects of other forms available in order to achieve convenient storage of forms.

#### 3.2 Anatomical Aspects

The form is divided into two aspects which are the Headings and the Body. The headings include the title of this form "Bandung Knee Orthopaedic Sport Checklist" and the patient's registration sticker. The body includes the content of the form itself which are the operator, patient's identity, history of the disease, physical examination, MRI findings (if performed), treatment plans, postoperative rehabilitation, and evaluation.

#### 3.3 Content Aspects

The contents included in this form were brainstormed by consultants. The points inserted were information that may help the evaluation of treatment in the future. The operator is referred to as the consultant who performed the treatment. The patient's identity includes name, age, medical record, height, weight, and occupation for registration purposes.

The history of the disease consists of the chief complaints, etiology, and onset. Chief complaints were pain, instability, pain and instability, swelling, effusion, hemarthrosis, etc. Etiology was divided into accident or injury. Injury causes were further divided into professional (athlete) and recreational sports injury and elaborated into the type of sport causing the complaints e.g. basketball, football, futsal, martial arts, etc. Onset was divided into less than a month, one to six months, 6 months to one year, and more than one year.

Physical examination included the assessment of bone maturity (mature or immature) and ligament laxity examinations e.g. anterior drawer, posterior drawer, Lachman, sag sign, Mc Murray, pivot shift, valgus, varus tests, etc. The conclusion of the test was then concluded as the presence of absence of laxity (yes or no).

MRI findings are also reported, if performed, into total or partial rupture of ligaments, meniscus tear, osteoarthritis and osteochondral dissecans.

Treatment was divided into conservative and operative. Operative treatment is subdivided into open surgery and arthroscopy based on the technique performed. Graft choice includes BPTB, quadriceps, hamstring (Gracilis& Semi-T), peroneal, biograft, synthetic, etc. Implant includes a button and its size, screw and its type and size (e.g stainless, titanium, or bio), or other additional fixation devices. The initial and final length of graft, number of strands (i,e double, triple, quadruple, etc.), and diameter are also included. The next section is the length and diameter of the tunneling in the femur or tibia. After that, thigh circumference and length from the great trochanter to the lateral condyle are also included. Next is the reconstruction technique e.g single or double bundle, anatomical or non-anatomical, etc.

Rehabilitation segments included the usage of crutches, knee brace and the amount of physiotherapy patient must undergo. Physiotherapy were divided into once a week, twice a week, thrice a week or every single day in a week. Finally, for evaluation, complaints such as swelling, pain, numbness, joint rigidity, atrophy, and instability.

#### 4. Discussion

In the nonacute setting, a clinical evaluation by a surgeon is one of the most accurate diagnostic methods for knee pathology. In the acute setting, this accuracy decreased because of the pain the patient is experiencing which makes them uncooperative (Iobst et al., 2000). One study by Ibeachu et al. found that from 100 participants with the complaint of knee problems, only 31 realized that their problem was caused by a sudden injury. From those same populations, the majority (91%) provided information regarding their symptoms. The majority of the complaint was pain (69.9%) followed by "giving way" (22.5%) and locking (7.5%). Another important point is differentiating the onset of the problem and classifying them as acute (>3 weeks after injury), subacute (3 – 12 weeks), or chronic (>12 weeks) (Ibeachu et al., 2019). Most of the patient coming with knee problem was between 20 – 29 years old (43.1%) followed by 30 - 39 years old (20.9%) and 10 - 19 years old (16.9%). A very small proportion came from

pediatrics to patients older than 70 with the proportion 0.04% and 0.2%, respectively. Regarding the injured anatomical structure, no significant difference was found between age groups (Majewski et al., 2006).

A high proportion of sports injuries involve the knee and sports activities contributed to 20 - 25% of all knee injuries. This rate has increased significantly because more and more people started to perform sports, either as professional or as leisure activities. Sports that produced the highest rate of injury is the one that puts a high impact and burden on the lower limbs. The severity of sports injury is by no means a minor one. It has been found that it is comparable to that a traffic accident (Steinbruck et al., 1999). Sports injury also occurs at twice the rate of injury caused by traffic accidents, making it a prevalent problem in society (Holzach et al., 1994).

Regarding the type of sport that has a high rate of a knee injury, Nicolini et al. found that American football caused the highest number. This sport involves sudden large movement changes and exerts a massive burden on the lower limbs. Furthermore, inadequate flooring and technical or medical supervision push the rate even higher. Another study by John et al. has a different finding in which knee injury is mostly associated with football and kabaddi, a popular Indian rural sport. Knee injury accounts for 30.6% of injuries in football and 20.9% in the latter. Other sports that are associated with a knee injury are athletics, cricket, volleyball, and basketball (Nicolini et al., 2014).

Majewski et al. found that in 33.9% of cases, minor knee distortion occurred without damage to any particular structure. In 10.6% of the cases, acute and chronic lesions on the joint cartilage were found. The rate of ligament rupture was quite high with 22.3% of the patients having an anterior cruciate ligament rupture, 10.8% having a medial meniscus rupture, and 7.9% having an MCL lesion. Injury to postero-lateral structures was less frequent. PCL ruptures were seen in 0.65%, lateral meniscus in 3.7%, and lesions in 1.1% of the cases. Contusions were found in 10.6% of cases. They found that knee dislocation was rare, while patella dislocation was experienced in 3.3% of cases. The rate of fracture and superficial skin wounds was low. However, in the long run, chronic and degenerative changes were prevalent (Majewski et al., 2006).

John et al. reported that the majority of patients (69.6%) underwent an arthroscopic surgical procedure while the rest were treated conservatively with bracing and/or physical therapy.19 There are several grafts available for ACL repairs such as autografts [bone patellar tendon-bone (BPTB), Hamstring (HS), etc.], allografts, and synthetic grafts. Before autograft was the method of choice but in recent decades allograft has gained popularity. It is now performed in 20 - 30% of cases in the United States of America (Dhammi et al., 2015).

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The authors declared no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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## Appendix A

KNEE ORTH BANDUNG	EDIC SPORT ECKLIST		PATIENT'S MED	PATIENT'S MEDICAL RECORD STICKER					
Dr/Operator	:								
Name Age Medical record	: :			Heij Wei Occ	ght ight upatio	: : n :			
Complaints	:	<ul> <li>Pain</li> <li>Instability</li> <li>Pain and instabilit</li> <li>Swelling</li> </ul>	У	<ul> <li>Efusion</li> <li>Haemarthro</li> <li>Others:</li> </ul>	osis				
Causes	:	□ Accidents □ Injury : □ Non- □ Spor	Sport t	<ul> <li>□ Professional/athle</li> <li>□ Recretional spor</li> </ul>	ete rt	<ul> <li>Basketball</li> <li>Futsal/mir</li> <li>Football</li> <li>Martial art</li> <li>Others</li> </ul>	ni soccer s		
Onset	:	$\Box$ < 1 month $\Box$ 1 – 6	mont	ths 🗆 6 month – 1 ye	ear 🛛	□ > 1 year			
Skeletal	:	<ul> <li>Mature</li> <li>Immature</li> </ul>		Physical Examination :	□ Ant □ Pos □ Lacl	erior drawer terior drawer hman	<ul> <li>Pivot shift</li> <li>Valgus test</li> <li>Varus test</li> </ul>		
Laxity	:	🗆 Tidak 🛛 🗆 Ya			□ Sag □ Mc	Sign Murray	□ Others		
MRI	:	□ No □ Yes, results :	□ P □ T □ P	artial rupture ACL otal rupture ACL artial rupture PCL otal rupture PCL		<ul> <li>Partial rup</li> <li>Total ruptu</li> <li>Medial me</li> <li>Lateral me</li> </ul>	ture LCL ire LCL niscus tear niscus tear		
Knee	:	□ Dextra □ Sinistra	□ P □ T	artial rupture MCL otal rupture MCL		<ul> <li>Osteoarthr</li> <li>OCD (osteo</li> </ul>	ritis ochondral dissecan)		
			Y CALL		ateral		Media		

Management	:	□ Conse □ Surgio	ervative cal :	e □ Op □ Ar	oen surg throscoj	ery py							
Reconstruction technique	:	□ Single □ Doub	e bundl le bund	e dle	□ Ana □ No	atomi n ana	c tomic	□ 0	thers				
Graft	:	<ul> <li>BPTB</li> <li>Quadriceps</li> <li>Hamstring (Gracilis &amp; Semi-T</li> </ul>		T)	□ Peroneal □ Biograft ) □ Synthetic			🗆 Lainnya					
Implant	:	🗆 Butto	n , Size	: (	⊐ <b>1</b> 5 ∣	□ 20	□ 25	□ 30					
		□ Screw	: 🗆 Sta	ainless anium	- Ukur	an	Diamete	r (mm)	□ 4 □ 9 □ 20	□ 5 □ 10 □ 25	□ 6 □ 11 □ 30	□ 7 □ 12 □ 35	□ 8 □ □ 40
				)	-		Panjang	(mm)	□ 45	□ 50	□		L 10
		🗆 Other	additio	onal fixa	ation dev	vices	:						
Graft	:	□ Initial : □ Final g	graft le raft ler	ngth: Igth:	cm . cm		Double	🗆 Triple	e 🗆 Qu	adriple	🗆 Lair	ınya	
Graft's diamete :	r	□ < 6 mn □ 6 mm □ 6.5 mr	n n	□ 7 mr □ 7.5 r □ 8 mr	n nm n	□ 8. □ 9 □ 9.	.5 mm mm .5 mm	□ 10 □ > 1	mm .0 mm				
Tunnel	: Fer	□ Length Femur □ Diamet			n) : m) :								
	Tibia		Diameter (mm) :										
ALL Reconstruction	:	□ Yes □ No	:	□ Intra □ Extra	articular Iarticula	r tech r tech	nique inique	Implant	□ Sc □ Bio	rew osure		Staples Others:	
Thigh	:	□ Thigh □ Thigh	circumi length (	<sup>f</sup> erence (Great t	(middle roch – L	e) at co	ndyle)	Right : Right :	cm cm		Left : Left :	.cm .cm	
Tongkat			:	🗆 Yes		□ N	lo						
Knee brace			:	□ Yes		□ N	lo						
Physiotherapy			:	□ 1x/v	veek	□ 2	x/week	□ 3x	/week	🗆 Da	aily		
Postoperative complaints				<ul> <li>Swe</li> <li>Pain</li> </ul>	lling	□ Jo □ A	oint stiffi trophy	ness					
Other informati	ons		:	□ Nurr	nbness	□ Ir	nstability	1					