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Original article

Current state of anterior cruciate ligament registers

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ABSTRACT

Purpose: The purpose of this work was to report the main characteristics and results of all active anterior cruciate ligament (ACL) reconstruction registers along with the differences between them.

Methods: We systematically searched on Google and Medline via PubMed to identify ACL registers. National or regional registers were included if they were active and took into account ACL reconstructions. The main results and characteristics, namely the number of inclusions, exhaustivity, data collection methods and results dissemination methods were determined. The collected information was then submitted to each register for validation.

Results: Four registers (3 national, 1 regional) were identified that routinely included every ACL reconstruction procedure. Register data were collected either through dedicated websites or on paper forms. All the registers used the same two outcome measures, namely the revision rate and a subjective patient score (KOOS score). Register results were made available through scientific publications or annual reports. The main differences between registers were in the graft choice and presence of associated meniscus and cartilage injuries.

Conclusions: Although there are only a few ACL reconstruction-specific registers, their scientific contribution is undeniable thanks to the quality of the collected data and the organization and collaboration between registers. Their impact on health care and science should grow in the future.

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1. Introduction

Over the years, anterior cruciate ligament (ACL) reconstruction surgery has become a reliable surgical procedure aimed at restoring knee stability and preventing meniscus and cartilage deterioration [1–3]. Despite the large number of randomized studies on this topic, many aspects of ACL reconstruction, such as the choice of graft type and fixation method, are still controversial [4,5]. Moreover, there is little information available on long-term results and revision rate. The costs incurred and the reported surgical complications accentuate the need to have an effective, exhaustive surveillance tool [6].

Registers are observational study tools with many advantages. They are used to examine patient-related information and allow for long-term prospective follow-up of the surgical techniques and the implants used [7]. Unlike randomized studies, registers are able to detect adverse events early on, even rare ones, to limit the consequences for patients and costs for the healthcare systems [8]. Registers also give surgeons the possibility of receiving feedback

about their professional practices, while providing the health authorities with a surveillance tool [9,10].

The first orthopedic registers were created in Scandinavia in the 1970s to evaluate hip and knee arthroplasty [11]. Over the years, these registers have relied on extensive expertise in data collection and patient follow-up to better understand factors affecting the survival of joint implants [9,12]. These registers have also inspired new registers on shoulder arthroplasty, femoral neck fractures and arthroscopic ACL reconstruction.

The purpose of this work was to report the main characteristics and results of all active anterior cruciate ligament (ACL) registers along with the differences between them. The working hypothesis was that active anterior cruciate ligament reconstruction registers have already contributed to better evaluations of this surgical procedure.

2. Materials and methods

2.1. Identification of ACL reconstruction registers

From December 2012 to January 2013, a systematic search was performed to identify all of the ACL reconstruction registers that were active at that time. Included were all registers evaluating

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Table 1
Methods of results dissemination used by the various ACL reconstruction registers and their website address.

	Language(s) used on website/Internet address	Annual report available on website Last year of publication Language	Number of publications in peer-reviewed journals	Median impact factor of publications [min–max]	Other scientific production	Surgeon feedback
DKRL	Danish English http://kea.au.dk/en/qualityassessment/clinicaldatabases/danishhiparthroplastyregistry/	Yes 2009 Danish	6	2.2 [2.1–3.7]	Thesis	Yes
NKRL	Norwegian English http://nrlweb.ihelse.net/eng/	Yes 2010 English	14	2.2 [0–4.1]	Presentations Posters Thesis	Yes
SNKRL	Swedish English http://www.artroclinic.se/scripts/cgiip.exe/WService	Yes 2012 English	10	2.2 [2.1–3.7]	Presentations Letters	Yes
KP ACLRR	English http://xnet.kp.org/permanentejournal/nirw-work_ext/Registries/acl.htm	NR	12	3.2 [2.2–3.7]	Presentations Posters	NR

NR: not reported.

anterior cruciate ligament reconstruction (primary or revision) that were active at the time of the study and included patients on a regional or national scale. Any registers that were inactive at the time of the study were excluded.

Two web searches, one using Google and the other using Medline via PubMed, were performed. The following keywords were used: “ACL and register”, “ACL and registry”, “ACL reconstruction and register”, “ACL reconstruction and registry”. In addition to these web searches, the registers listed on the EFORT website (<http://www.eart.org>) were analyzed to determine if any of them included ACL reconstruction procedures. Once the registers had been identified, we looked at the various register websites to collect information about how they operate. The keywords used for the Google search were the exact register names (Table 1).

2.2. Register methodology and primary data

This information was found on the register’s website and in its publications (Table 1). The main pieces of information collected were the register’s exact name, coordinating society or organization, year launched, register participants (surgeons, patients), data collection methods and exhaustivity rate. The following information was also collected: patient demographics (gender, age, BMI), number of ACL reconstruction procedures included (with distinction made between primary and revision procedures), associated injuries, type of graft used, associated procedures and outcomes (functional score, number of revisions, etc.).

2.3. Scientific productivity and results dissemination methods

The various methods used by registers to disseminate their results were recorded. Each register’s website was consulted to look for an annual report or a list of scientific publications based on the register’s results (Table 1). In parallel, a systematic PubMed (Medline) search was conducted to identify all the publications in peer-reviewed medical journals that were based on each ACL reconstruction register. The keywords used were the exact register names. Every English article that was referenced in PubMed and presented results derived from the registers in question was retained. Letters, comments, editorials and conference abstracts were excluded. The results of the PubMed search were then cross-referenced with the publication list taken from each register’s website to ensure exhaustivity and remove duplicates. The median

impact factor for each register was determined using the 2012 Journal Citations Reports (JCR).

2.4. Questionnaires sent to registers

In parallel, a questionnaire was sent by email to each register’s representative(s) to confirm the data that we had collected and correct any information as needed. A second email was sent 15 days later if no reply had been received to the initial message.

3. Results

3.1. Register selection and how they operate

Of the seven registers identified, four met the inclusion criteria and were selected for the study (Fig. 1). Three of the registers were national Scandinavian registers: Swedish National ACL Register (SNKRL), Danish Cruciate Ligament Registry (DKKR) and Norwegian Cruciate Ligament Register (NKLR). The only regional register (Kaiser Permanente Anterior Cruciate Ligament Reconstruction Registry) was American and included 40 centres with 220 surgeons. The British register was not included in this study because it was not active at the time that registers were identified. The Moon register (which is truly a cohort study) and the local HSS register were excluded.

The main characteristics of the active registers are given in Table 2 [6,13–17]. These registers were mostly funded by government health authorities. For example, the cost to operate the Norwegian register in 2009 was about €80,000 [16]. Depending on the country, register participation was either mandatory or voluntary and data collection was performed either through a secured website or on paper forms (Table 2). Data collection was divided into two sections: one for the patient (self-evaluation) and one for the surgeon. The surgeon filled out a standard questionnaire immediately after the surgery, while the patient was required to fill out a questionnaire at regular intervals (Fig. 2).

3.2. Analyzed data and main register results

The main register results, namely the inclusions, are summarized in Table 3 [6,13,15,16,18–21]. All the registers used an objective outcome (revision rate) and a subjective outcome provided by the patient (Knee Injury and Osteoarthritis Outcome

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