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The Incidence and Management of Osgood-Schlatter Disease in General Practice

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Abstract:**Background**

Osgood-Schlatter disease (OSD) is a non-traumatic knee problem that primarily observed in sports active children and adolescents between the age of 8 and 15.

Aim:

The objective of this study was to determine the incidence of OSD and to gain insight into the management of children and adolescents with OSD in general practice.

Design and Setting

A retrospective cohort study was conducted using a healthcare database containing full electronic health records of over 200,000 patients in general practice in and around the Dutch city of Rotterdam.

Methods

Patients with a new diagnosis of OSD between the years 2012-2018 were extracted using a search algorithm based on International Classification of Primary Health Care (ICPC) coding and search terms in free text. Data on the management of OSD were manually interpreted.

Results

The mean incidence over the study period was 3.8 (95% CI 3.5-4.2) per 1000 person years in the age group of 8-19 years. Boys had a higher incidence rate of 4.9 (95% CI 4.3-5.5) compared to girls, at 2.7 (95% CI 2.3-3.2). Peak incidence was at age 12 for boys and at age 11 for girls. Advice was the most commonly applied strategy (55.1%), followed by rest (21.0%) and referral for imaging (19.5%) and physiotherapy (13.4%).

Conclusion

For the first time the incidence of OSD is calculated using GP electronic medical files. There is a discrepancy, especially for imaging and referral to a medical specialist, between the current general practice guideline and what GPs actually recommended.

Keywords

Osgood-Schlatter disease, incidence, management, general practice, primary health care

Abbreviations

OSD: Osgood-Schlatter disease, GP: General Practitioner, NHG: Dutch general practice, CI: Confidence Interval

How this fits in

Osgood-Schlatter disease (OSD) is a non-traumatic knee problem that mainly presents in children and adolescents during puberty and has a significant negative effect on quality of life, physical activity and social interactions. This study is the first retrospective cohort study that provides insight in the incidence of OSD in general practice as well as the different management types used by GPs. In this study we

discovered a discrepancy between Dutch guideline for general practitioners (NHG) and the described management. There was a higher use of imaging and referral to a medical specialist compared to guideline recommendation. GPs should be aware of this discrepancy and their awareness and knowledge about and the management of OSD may be improved.

Introduction

Knee pain (32%) is the most frequently reported musculoskeletal pain complaints during adolescence(1). Knee pain account for the second highest number of general practice consultations for musculoskeletal problems in children and adolescents aged between 3 and 19 years old(2). Peak prevalence for general practice consultation due to knee pain occurs in age range between 12 and 17(2). In Dutch general practice the incidence of consultations due to knee pain range from 10.6 to 17.4 per 1000 patients between the age of 4 and 24. In this age group, prevalence ranges from 12.4 to 22.5 per 1000 patients (3). Up to 25% of the children and adolescents with musculoskeletal problems will experience chronic or recurrent pain making initial management important(4-6).

One of the most common non-traumatic knee problems in children and adolescents is Osgood-Schlatter disease (OSD)(3, 7). According to a retrospective questionnaire distributed in an outpatient sports clinic, OSD affects 12% of the boys and girls between nine and fifteen years old, with an even higher prevalence in sports active adolescents (21%)(8). OSD is widely accepted as a traction apophysitis of the tibial tuberosity caused by repetitive strain on the patellar tendon at the point of insertion(9-15). OSD is often characterized by knee pain and tenderness at the tibial tuberosity, swelling, thickening of the patellar tendon and enlargement of the tibial tuberosity during physical examination(16-18). The pain typically occurs during activities that load the knee extensors and subsides in rest(16, 19-21). OSD is generally considered a self-limiting disease that is expected to cease with skeletal maturity and rarely last more than 18 months before resolving completely (22). However more recent research has indicated that OSD may become chronic(5, 6, 23-26).

Currently, there is a glaring absence in knowledge about OSD in general practice. Until now, most studies focused on musculoskeletal or knee problems in general, are open population surveys and often not in the age-range where OSD mostly is observed. Despite the common occurrence of OSD in children and adolescents the actual consultation rate in general practice is still unclear and the initial management has never been described(27). The objective of this study was to estimate the age- and sex-specific incidence of OSD in Dutch general practice and to gain insight in the different types of management strategies applied by GPs.

Methods

Design and setting

A retrospective cohort study was conducted in the Rijnmond Primary Care Database (RPCD). The database contains anonymous longitudinal data on demographics, symptoms and diagnosis, correspondence to and from secondary care and drug prescriptions of over 200,000 participants in the

greater area of the city of Rotterdam(28). The RPCD is a regional derivative from the nationwide Integrated Primary Care Information(IPCI) database(29, 30). In the Netherlands registration with a general practitioner (GP) is obligated for citizens and if medical care is required the GP is contacted first, also for referrals to secondary care.

Study cohort

The study population consisted of children (between 8 and 19 years old) with a new episode of OSD between 1 January 2007 and 31 December 2017. The diagnosis was considered new if the patient had not been diagnosed with OSD in the preceding 18 months before initial diagnosis after their start date in the database. Patients could be included in the study population more than once, if there was more than 18 months between the initial diagnosis and subsequent consultations of OSD. Diagnoses of OSD were identified using the International Classification for Primary Care (ICPC) coding and with supporting keywords in the free text(31). Patients were considered an OSD case if they received the ICPC code L94 (Osgood-Schlatter/other osteochondropathy), L94.02 (Osgood-Schlatter Disease), or if they received the ICPC code L15 (Knee symptoms/complaint) in combination with the words “Osgood-Schlatter”, “Osgood” or “Schlatter” in the free text of the consultation with the GP. The final algorithm excluded hits that were combined with terms of negation (ex. not or no) and hits where the GP combined the L94 and L94.02 ICPC codes with a specific diagnosis other than OSD, for example “patellofemoral pain” or “Sever’s disease”. Cases were considered to be a true OSD case if the GP defined the consultation as OSD or considered it as one of several possible diagnoses (i.e. in the differential diagnosis). Cases where the OSD diagnosis did not match our definition were excluded for further analyses. Unclear cases were inspected by a senior researcher (ES), and final decisions whether or not to include the case as OSD were based on consensus.

Data extraction

The full medical files were examined from the consultation date of the initial diagnosis until the end date of the medical file in the database. For each patient, information on date of birth and sex were extracted. Furthermore, the interventions applied by the GP, the referrals and the number of consultations with the GP for one episode of complaints related to OSD were extracted from the full medical record by one of the authors (GvL). The management strategies that took place at every consultation were registered: advice, wait and see, rest, medication or cooling therapy) and referral comprising of imaging (X-ray, ultrasonography or MRI) , physiotherapist, orthopedic surgeon, sports medicine and other (para)medical specialists (i.e. podiatry or therapeutic movement therapy). Even

though advice, wait and see and rest often are interchangeable and have the same intention, differentiation was made based on the use of specific words in the text. Multiple management strategies could be administered per consultation. For each patient the date of the first consultation and each subsequent consultation were extracted as well as the total number of consultations. Telephone consultations were counted as consultations, provided that the GP registered a contact with the patient and discussed the diagnosis or management of OSD.

Statistics

The incidence rate of OSD per age group between 8 and 19 was determined by dividing the number of OSD cases by the total number of person-years of follow-up in all patients aged 8 to 19 included in the RPCD and expressed per 1000 person-years. Ninety-five percent confidence intervals (95% CI) were calculated using Poisson distribution. The incidence rate was calculated over the period between 2012 and 2018, since there was a low amount of participating GP practices in the database before 2012 and numbers are therefore more robust by using data from 2012 onwards. Descriptive statistics were used to describe the management strategies applied and number of consultations of patients with OSD in the entire study period. All analyses were performed using SPSS version 25, R Studio was used for Poisson distribution.

Results

General characteristics

The search strategy in the database delivered 716 OSD cases, containing 556 patients aged between 8 and 19 at the moment of diagnosis. After manual inspection, 489 true OSD patients remained, including 515 new OSD episodes. The overall incidence in this population was 3.8 (95% CI 3.5-4.2) per 1000 person years. A total of 64.7% of the OSD patients were boys with an incidence of 4.9 (95% CI 4.3-5.5) per 1000 person years compared to 2.7 (95% CI 2.3-3.2) in girls. Within the period of 2012 to 2018, the yearly incidence was stable with overlapping 95% CI's. The median age of the incident OSD population was 12 years (P_{25-75} 11-13), the median age for boys was 12 years (P_{25-75} 11-14) and girls 11 years (P_{25-75} 10-13). Peak incidence was 13.8 (95% CI 10.8-17.4) per 1000 person years at age 12 for boys and 6.0 (95% CI 4.1-8.6) at age 11 for girls (Figure 1).

Consultations and management strategies

The 515 incident cases resulted in a total of 724 consultations (range 1 to 4). In 69.5% of patients (n=357), the OSD episode was limited to one consultation. Details about the provided management strategies during the consultations are shown in Supplementary Table 1. During the first consultation of all episodes advice was the most frequently applied management strategy by the GP (61.0%), followed by rest (23.5%) and imaging (17.5%). In 10.9% the GP applied a wait and see policy. Analgesics (either paracetamol or NSAIDs) were prescribed in 6.8% and cooling therapy in 3.5% of the first consultations. Referral was most often to a physical therapist (11.5%) followed by the orthopedic surgeon (3.3%), sports physician (1.0%) and other (para)medical specialists in 1.6% of the consultations.

Follow-up consultations

158 (30.7%) patients had multiple consultations (range 2 to 4) for OSD with their GP within 18 months of the initial diagnosis: 59.5% were boys with a median age of 12 (P_{25-75} 12-13). The median time between the first and second consultation in these patients was 53 (P_{25-75} 13-165) days. Supplementary Table 1 shows that advice is the most often applied management strategy until the fourth consultation when referral to the orthopedic surgeon was most often applied. In general, the rate of referral for imaging or to a medical specialist rises with each following consultation. For example, almost a third of the patients (27.7%) at second consultation were referred for imaging. Furthermore, the rate of referral to the orthopedic surgeon increased with each following consultation, i.e. a rate of 3.3% at first and 44.4% at fourth consultation. Figure 2 provides an overview on the flow of patients after their first consultation. Patients that received medication or were referred for imaging had a higher percentage of second consultations, respectively 40.3% and 56.6%, compared to advice and referral (27.4% and 22.7%). Irrespective of the applied management at first consultation the amount of advice given at second consultation remains relatively stable while the use of imaging and rate of referral rise.

Discussion

This study is the first retrospective cohort study that provides insight in the incidence of OSD in general practice as well as the different management strategies applied in this population based on longitudinal population data. We found an incidence for OSD of 3.8 per 1000 person years in the age group of 8-19 years, with a higher incidence for boys than girls. This incidence indicates that an average GP practice (255 patients aged 8 to 19 total) in the Netherlands sees about one new OSD patient per year. In our population, the peak incidence was one year earlier in girls compared to boys. Most patients (69.3%) only visited the GP once. Most patients received a wait and see policy including advice and rest at the

first consultation. Nevertheless, in 17.5% of the cases the GP referred the patient for imaging despite the advice of the current NHG guideline(32). Only 11.5% were referred to the physical therapist.

Strengths and limitations

This is the first study to examine the incidence of OSD based on medical files of a large group of patients in general practice. It gives a representative overview on the incidence and management in general practice.

GP medical records are not primarily intended for data collection and have certain limitations, for example possible selection bias as a result of the diagnostic accuracy of the GP and dependence on reporting in the medical file by the GP(40). Moreover, technically speaking the incidence may be considered as the incidence of recorded consultations, as we were dependent on medical files. To limit the possible underestimation of the overall incidence due to limited medical notes or non-uniform ICPC coding(41), multiple ICPC codes and free text terms to identify OSD cases were used.

We used a maximum duration of complaint cutoff point of 18 months(22). In the analyses this may have led to a duplicate count of one OSD incident into two separate incidents. Which could for example lead to a patient being referred to the orthopedic surgeon at first consultation while this actually was the third consultation within a larger timeframe. We believe this had limited impact on our overall conclusions as this situation could only have occurred in a maximum of 26 patients. The decision to maintain the cutoff point of 18 months came from the most common belief that OSD, aside from rare instances, is not a complaint that spans multiple years(22). Lastly, 123 (23.9%) patients did not have at least 18 months of follow up time. However, this is highly unlikely to have relevant impact on the results since most patients (91.8%) had a maximum of two consultations with a median of 53 days between first and second consultation.

Comparison with existing literature

We found an incidence of 4.9 and 2.7 for boys and girls per 1000 person years respectively. Currently, no other incidence data for OSD is available in literature. Similar to our findings, a previous study also showed a higher frequency of OSD in boys (15.2%) compared to girls (10%) in children aged 9 to 15(8). In our population, the difference in peak incidence between girls and boys was only one year, respectively at 11 and 12 years of age. This is in concordance with previous literature where the occurrence of OSD is higher in boys compared to girls, but in girls complaints present at an earlier age. Possibly because of the earlier onset of puberty and skeletal maturation in girls(8, 16, 33).

According to current research and the NHG guideline, OSD is a clinical diagnosis based on anamnesis and

physical examination and management is conservative guided by the severity of the symptoms(19, 22, 32, 34, 35). A multi-national survey showed that healthcare professionals favor education and exercise therapy in the management of OSD(27). In concordance with previous literature and the NHG guideline(32) most patients in this study received advice (55.1%) followed by rest (21.0%). However, most adolescents with OSD are often highly physically active, thus resting and therefore recovering may be difficult for patients (8, 36). Recently, Rathleff et al. (2020) investigated the effectiveness of an intervention consisting of education on activity modification and knee strengthening exercises in 51 OSD adolescents (37). They showed that patella tendon loading and pain management, hip and knee strengthening and jumping exercises resulted in a self-reported improvement of 80-90% after 12 to 52 weeks respectively. In this study in only 13.4% of all consultations patients were referred to a physiotherapist, though the actual content of the management is unknown. Despite limited evidence from literature, personalized physical activity programs may offer a beneficial alternative management approach in order to improve clinical outcomes.

The NHG guideline(32) explicitly states that there is no added benefit whatsoever of imaging (X-ray or MRI) and referral to the orthopedic surgeon(38). Remarkably, patients were referred for imaging or to the orthopedic surgeon in respectively almost 20 and 8 percent of all consultations. This discrepancy could be due to the lack of knowledge regarding OSD and the management of OSD by the GP. In addition to an attempt at gaining insight into the severity of the complaint or to appease the patient. Lastly, it may be a sign of the growing overutilization of diagnostic imaging(39). The rate of referral to the orthopedic surgeon seems to correlate with the number of consultations. Since the percentage increased with each following consultation, i.e. a rate of 3.3% at first and 44.4% at fourth consultation. This is likely explained by the severity of the complaint, patients with more severe OSD will probably visit the GP more often for the complaint. Furthermore the ineffectiveness of previous advice or management can also contribute to the GP referring to the orthopedic surgeon to get an expert opinion.

Implications for practice

OSD is a common and impactful(36) complaint in children and adolescents with an incidence of 3.8 per 1000 person years. Peak incidence for boys and girls was at age 12 and 11 respectively. There is a discrepancy between the current NHG guideline, and how GPs manage the condition in clinical practice. As OSD mostly occurs in sports active adolescents(8, 36), future research into personalized physical activity programs may offer opportunities to make progress in effectively treating OSD in general practice. Better understanding and management of OSD, specifically in persistent cases, could decrease the amount of consultations and thus the overutilization of imaging and referral to a medical specialist.

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Ethical approval:

This study was approved by the Governance Board of the Rijnmond Gezond database. Medical ethical approval was not necessary, since all patient data was anonymized.

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Competing interests:

No conflict of interest was reported for this study.

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Figures

Figure 1:

Incidence and age distribution of OSD during the years 2012-2018.

1a: The incidence of OSD per age-group.

1b: Age distribution in a cohort of 422 patients with incident OSD.

Figure 2:

Overview of patients and types of management depending on type of management at first consultation.

Figure 1: The incidence and age distribution of OSD during the years 2012-2018.

1a: The incidence of OSD per age group

1b: The age distribution in a cohort of 422 patients with incident OSD

165x50mm (300 x 300 DPI)

*Patients could receive more than one intervention per consultation, therefore the total of patients in these cells does not add up to 100%.

**Referral to the physiotherapist, orthopedic surgeon, sports physician or other (para)medical specialists.

Figure 2: Overview of patients and types of management depending on type of management at first consultation