

Synovial Hemangioma of Knee Joint in Children and Adolescents a Case Series**Shambhu Kumar¹, Ranjit Kumar Singh², Binit Diwakar³**¹Assistant Professor, Department of Orthopedics, Nalanda Medical College & Hospital Patna, Bihar, India²Associate Professor, Department of Orthopedics, Nalanda Medical College & Hospital Patna, Bihar, India³Senior Resident, Department of Orthopedics, Nalanda Medical College & Hospital Patna, Bihar, India

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Abstract:**Background:** Synovial hemangiomas are benign vascular tumors that can occasionally develop in the knees of infants and adolescents. These malignancies are uncommon. Due to a lack of information, the radiological appearance, histological characteristics, and clinical presentation of this disease in this population need to be better understood.**Materials and Methods:** Fifty-five patients of synovial hemangioma of knee joint in child and adolescents were selected for retrospective study who came for treatment in the Department of Orthopedics in Nalanda Medical College and Hospital Patna, Bihar, India from January 1, 2020, to December 31, 2022. The selection of patients was based on the outcomes of clinical examinations, imaging tests (such as Magnetic Resonance Imaging [MRI] and ultrasonography), and pathology confirmation.**Results:** Recent research indicates that synovial hemangiomas of the knee in adolescents are uncommon. The average age of the patients was 12, and marginally more men than women made up the total population. Edema, tenderness, and limited joint mobility were the most prevalent clinical symptoms in the affected joints. Multiple radiological investigations indicated that the synovial membrane contained vascular lesions. Histopathology provided conclusive proof of abnormal endothelium proliferation and blood vessel formation.**Conclusion:** This case series is incredibly fascinating due to the rarity of synovial hemangiomas. The results improve our comprehension of the clinical symptoms, radiological findings, and histological characteristics of this disease in this population. Through prompt diagnosis and treatment, it is possible to preserve the patient's joint function and achieve improved outcomes overall. More research is necessary to determine which treatments are the most effective and generate the best long-term results for these patients.**Categories:** Healthcare Technology, Other.**Keywords:** Adolescents, Case series, Children, Clinical presentation, Histopathological characteristics, Hemangioma, Knee joint, Radiological features, Retrospective analysis, Synovial.

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Introduction

Synovial hemangioma is a rare form of vascular cancer that affects the knee joint of young child's and adolescents most frequently. This condition is characterized by increased blood vessels in the synovium, which can contribute to significant illness and functional impairment in the joints [1]. Less than one per cent of all joint lesions are synovial hemangiomas, with the knee being the joint most commonly affected. Especially during adolescence, it disproportionately impacts youth. Due to the lack of research on its aetiology, synovial hemangioma is occasionally misdiagnosed as an actual tumor [3]. This is a common issue. Although the condition can manifest in various ways, typical symptoms of synovial hemangioma

include joint enlargement, pain, and limited range of motion. Because these symptoms are also associated with other, more prevalent knee common conditions, such as meniscal tears and juvenile idiopathic arthritis, an accurate diagnosis may be difficult [4]. An untreated synovial hemangioma can result in joint injury, functional impairment, and even growth issues in patients with immature bones [5]. Due to the rarity of this condition, there is limited published information regarding the clinical presentation, radiological findings, and histological characteristics of synovial hemangioma of the knee in children and adolescents [6,7,8]. The findings of this study will contribute new information to what is currently

known about synovial hemangioma in children, thereby having significant implications. The discoveries will help medical professionals provide more accurate diagnoses, devise more effective treatment programmers, and provide patients with long-term benefits. In addition, the study has the potential to lay the foundation for future research, thereby facilitating the development of evidence-based treatment guidelines for synovial hemangiomas in children and adolescents.

Research objectives

- To conduct a retrospective analysis of a case series of synovial hemangioma patients in this age group.
- To comprehensively understand the condition's clinical manifestations, radiological findings, and histopathological features.
- To identify potential complications associated with synovial hemangiomas in the knee joint, such as joint stiffness or growth disturbances in skeletally immature patients.

Research Questions

1. How prevalent is synovial hemangioma in children, and what is the disease's incidence?
2. How prevalent is synovial hemangioma of the knee in children and adolescents, and what are the demographic characteristics (age, gender, etc.) of those affected by this condition?
3. What are the typical clinical manifestations of synovial hemangioma of the knee in toddlers and adolescents?

Literature review

Infrequent is the development of synovial hemangioma, a form of vascular cancer that originates primarily in the synovial membrane that lines joints. However, the incidence of this condition in children and adolescents is of particular interest because it may affect joint function and have long-term consequences. According to the results of numerous studies [9], synovial hemangioma in infants is a highly uncommon condition. For instance, [10] conducted a retrospective analysis of minor joint tumours and discovered that synovial hemangiomas constituted a negligible proportion of occurrences. This finding indicates that synovial hemangiomas are uncommon among adolescents.

Synovial hemangioma of the knee can induce a vast array of clinical symptoms. Common symptoms include joint oedema and pain, as well as decreased mobility. There is occasionally a substance that can be felt. The precise diagnosis is frequently delayed due to the similarity of these clinical symptoms to those of other knee joint diseases that are more prevalent in children and adolescents [11]. Synovial hemangioma can only be diagnosed through the utilization of diagnostic imaging. The

method of preference is MRI due to its superior ability to reveal the vascular nature of the lesion. Typical MRI findings include well-defined enhancing masses and the presence of flow defects within the synovial membrane. MRI can also detect abnormalities in blood flow. According to [12], ultrasound can detect hypervascular lesions with hypoechoic or mixed echogenicity.

A diagnosis of synovial hemangioma can only be determined with absolute certainty through histopathological examination. Under the microscope, synovial tissue displays both angiogenesis and endothelial proliferation abnormalities. Typically, the vascular gaps are surrounded by hyperplastic endothelial cells, which may differ in size and shape. According to [13,14], if the lesion has previously bled, hemosiderin deposits will be present. Surgery is the most common treatment method for synovial hemangiomas in juvenile patients. Total tumour removal is the treatment with the highest success rate for relieving symptoms, preserving joint function, and reducing the risk of cancer recurrence. If a complete excision is not possible, a partial excision or additional procedures such as embolization may be considered alternatives. Consequences such as recurrence and joint stiffness can only be detected through continuous surveillance over an extended period[15].

Another factor to consider is that synovial hemangiomas of the knee in young people are highly uncommon. To achieve the best outcomes, prompt diagnosis and treatment are essential. This literature review concentrates on synovial hemangioma in children and adolescents, highlighting its clinical characteristics, diagnostic approaches, and therapeutic concerns. The scope of the study includes clinical features, diagnostic strategies, and therapeutic considerations. Children and adolescents with synovial hemangioma require additional research and collaborative efforts to improve diagnosis, refine treatment procedures, and optimize outcomes.

Methodology

Study Design

Fifty-five patents of synovial hemangioma of knee joint in children and adolescent were selected for retrospective study who came for treatment in the Department of Orthopedics in Nalanda Medical College and Hospital Patna, Bihar, India from January 1, 2020, to December 31, 2022.

Inclusion Criteria

To be eligible for the study, patients had to be younger than 18 years old and diagnosed with a synovial hemangioma of the knee. Patients whose medical records were incomplete or unclear diagnoses were excluded from participation in the

trial.

Data Collection Process

A thorough evaluation of the patient's medical records was conducted as part of the data collection strategy. The clinical assessment results were documented, including information on the onset, progression, and remission of symptoms. The synovial hemangioma's radiological characteristics were analyzed using imaging modalities such as MRI and ultrasound. A biopsy or a surgical excision was performed to confirm the diagnosis pathologically to obtain specimens.

Ethical Considerations

We adhered to the ethical standards enumerated in the Declaration of Helsinki and any other applicable standards when considering the possibility of ethical issues. The local medical centre's ethical committee approved the study protocol and data collection procedures. The anonymization and archiving of patients' data protected their confidentiality.

Analysis

The data was entered into a database to be further analyzed. A summary of the demographic information, clinical presentations, radiographic characteristics, and histological findings of the patients was compiled using descriptive statistics. We utilized percentages, frequencies, and relevant correlations to present the results. In addition to the inherent limitations of a retrospective study design, the possibility of bias in the data collection procedure must be acknowledged as a limitation of this retrospective study analysis. Although it was impossible to eliminate these limitations, every effort was made to mitigate their effect on the overall reliability and validity of the results.

Results

This case series research work includes 55 patients diagnosed with synovial hemangioma of the knee between January 1, 2020, and December 31, 2022. Patients were evaluated based on demographic

information, clinical presentations, radiological characteristics, and histological findings.

Demographic Characteristics

Patients aged 4 to 17 years were treated, with the median age being 12 years. Sixty per cent of the cases involved men, so men were somewhat overrepresented. We reviewed the patient's medical histories to identify any patterns or correlations, but we were unable to do so.

Clinical Presentation

75% of instances of osteoarthritis are characterized by joint swelling, pain, and reduced range of motion. Patients diagnosed with synovial hemangioma of the knee typically described the symptoms above as the most prominent ones. Multiple individuals reported experiencing a noticeable bump in the knee affected by the condition. The symptoms may persist for a brief period (a few months) or an extended period (years).

Radiological Features

Radiological imaging techniques, such as MRI and ultrasound, were utilized to analyze the characteristics of the synovial hemangioma. Synovial membrane vascular lesions were the most frequently observed characteristic. MRI scans demonstrated these lesions to be discrete, enhancing masses containing flow voids. In addition, ultrasound detected hypoechoic or mixed echogenicity in hypervascular tumours.

Histopathological Characteristics

In every case where a biopsy or surgical removal was conducted, histopathology confirmed the presence of a synovial hemangioma. This condition was characterized by endothelial proliferation of the synovial membrane and abnormal blood vessels. The morphology and size of the vascular gaps were asymmetrical, and hyperplastic endothelial cells surrounded the majority of the gaps. In some instances, there were additional hemosiderin deposits in the localized regions.

Table1: Result of the Analysis

S.no	No of Patient	Clinical Presentation	Radiological Findings	Histopathological Characteristics
1	15	Swelling	Hypoechoic mass on ultrasound	Abnormal blood vessels
2	20	Joint swelling, pain	Hypoechoic mass on ultrasound	Hyperplastic endothelial cells, hemosiderin deposits
3	12	Joint pain, palpable mass	Flow voids on MRI	Vascular spaces with abnormal endothelial cells
4	8	Joint swelling, pain, restricted ROM	Well-defined enhancing mass on MRI	Abnormal blood vessels, endothelial proliferation

Interpretation

The investigation of a case series indicates that

synovial hemangioma of the knee in adolescents is uncommon. Symptoms manifested between 12 and

15, with a slight gender bias favoring male. Joint swelling, tenderness, and limited range of motion were patients' most frequently observed clinical symptoms. Typically, radiological imaging demonstrated distinctive vascular lesions within the synovial membrane. These lesions appeared on MRI as well-defined enhancing masses and on ultrasound as hypoechoic or mixed echogenicity masses. Histopathology provided conclusive proof of aberrant endothelium proliferation and blood vessel formation.

These findings emphasize the radiological and clinical aspects of synovial hemangioma of the knee in children and adolescents. The results support the hypothesis that synovial hemangioma should be considered a differential diagnosis in children with knee joint symptoms and specific imaging abnormalities. The findings of the histological examination support the diagnosis and provide insight into the aetiology of the disease. Each instance of synovial hemangioma has a unique clinical presentation, radiological findings, and histological features. It is essential to remember this fact for this purpose. Additional research is required to obtain more information regarding the clinical course, therapeutic outcomes, and long-term consequences of synovial hemangioma in this population, preferably with larger sample sizes and prospective research methods.

Discussion

Synovial hemangiomas of the knee in infants and adolescents, Insights from a case series investigation. Our findings are consistent with those of other studies that have shown synovial hemangioma to be a rare condition that manifests most frequently in children.

This conclusion is corroborated by additional research. Given that our study's average age of onset is consistent with that of other studies, it is essential for young patients who report knee joint symptoms to consider synovial hemangioma as a differential diagnosis. By the findings of previous research on synovial hemangiomas, histopathological examination confirmed the presence of abnormal blood vessels and endothelial proliferation.

The variation in vascular space size and structure observed in our patients is consistent with the histological heterogeneity described in the scientific literature. The presence of focal hemosiderin deposits in the synovial hemangioma indicates that the tumour has previously bled, which may have contributed to the patient's symptoms.

Implications of the study

Our findings have considerable therapeutic value.

To maximize the positive outcomes for patients, it is essential to initiate appropriate therapy approaches as soon as a proper and early diagnosis of synovial hemangioma is made. A clinical examination, radiographic imaging, and subsequent histological confirmation are essential diagnostic procedures. The familiarity of medical professionals with the disease and its characteristic clinical and radiological symptoms may facilitate the rapid diagnosis of synovial hemangioma. Surgical techniques, such as the excision of tumours, are still regarded as the gold standard for cancer treatment. However, the surgical procedure may vary depending on the type of lesion and its location on the body. In the event that complete excision of the tumour cannot be performed due to its size or location, viable alternatives such as embolization may be considered. Due to the probability of complications such as recurrence, joint stiffness, and growth abnormalities in skeletally immature patients, long-term follow-up is required.

Limitations

There is a possibility of bias in the selection process and other problems caused by the study's support on previously collected data, which are both things that could be improved in the study. A lack of long-term follow-up makes it difficult to comprehend the effects of treatment and the progression of the disease, and the small sample size may make it challenging to generalize the findings. A further limitation of the study was that it was conducted at a particular location, which may have prevented the collection of a sufficiently diverse and representative patient population.

Future Research

Due to gaps in our understanding of synovial hemangioma in children and adolescents. In prospective studies with larger sample sizes and collaboration with other centres, conducting a more exhaustive examination and validation of the clinical and radiological elements described would be possible. Long-term follow-up studies are required to evaluate the efficacy of therapies, the effectiveness of functional outcomes, and the occurrence of late issues. Research into the genetic and molecular components of synovial hemangioma could lead to the discovery of new treatment options and provide insight into the disease's cause. Multidisciplinary approaches are necessary for an accurate diagnosis and efficient treatment planning. These methods bring together orthopaedic surgeons, radiologists, and pathologists. Guidelines for long-term follow-up, standardized diagnostic criteria, and treatment protocols should result from a concerted effort to collaborate. The clinical outcomes for children and adolescents diagnosed with synovial hemangioma are anticipated to improve as specialists learn and

share more about this condition.

Conclusion

This case series illuminated young people knee synovial hemangioma. The findings emphasise this condition's specific clinical, radiological, and histological features in children and its rarity. This study emphasises the need of evaluating synovial hemangioma as a differential diagnosis in young knee joint patients. This is especially true with typical imaging anomalies. This study has major clinical implications. Clinical examination, imaging, and histology confirmation enable accurate diagnosis and therapeutic selection. Physicians must know synovial hemangiomas' clinical and radiological symptoms to quickly diagnose and treat them. This study analyses synovial hemangioma in young people. The findings support earlier findings on synovial hemangioma frequency, clinical symptoms, imaging findings, and histological markers. The study emphasises prospective trials with bigger sample numbers, long-term follow-up, and molecular analysis. All survey-identified study areas are here. In conclusion, the case series of synovial hemangioma in children's and adolescents' knees was informative. These discoveries will help diagnose, treat, and monitor synovial hemangioma patients, improving clinical outcomes.

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