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## ABSTRACT

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Introduction: Total knee arthroplasty (TKA) is one of the most clinically cost-effective and successful treatments for severe knee osteoarthritis (KOA) and significantly improves the quality of life of patients with this condition. Some endocrine dysfunctions, such as thyroid disorders and diabetes, play a vital role in the occurrence of postoperative complications Objectives of the study: The aim and objectives of our study is to find out the association if any between subclinical hypothyroidism and postoperative outcome in subjects undergoing total knee replacement. Materials and Methods: A prospective case-control study was conducted at our hospital Dept. of Orthopaedics Shri Balaji Hospital, Mowa, Raipur from December 2019-June 2020. Diagnosed cases of osteoarthritis and subclinical hypothyroidism following ICD-9, those undergoing unilateral and primary TKA were included. Results: It is quite evident from our study that the patients with a diagnosis of subclinical hypothyroidism had an elevated risk of both medical and surgical complications postoperatively compared with those without this condition. Discussion and Conclusion: Considering that the candidates for TKA are generally elderly and this condition overlaps with subclinical hyperthyroidism, it is necessary for orthopaedicians to perform a preoperative TSH assessment, especially for those aged >55 years, rather than only screening individuals with suspected thyroid disease or with known hypothyroidism (or hyperthyroidism), so that treatment can be given prior to TKA. Surgeons should postpone TKA, as an elective surgery for some patients with subclinical hypothyroidism, such as those with TSH  $\ge 10$ mu/until appropriate treatments and adequate care can allow thyroid hormones to achieve euthyroidism.

KEYWORDS : subclinical hypothyroidism, postoperative complications, euthyroidism, total knee arthroplasty

## **INTRODUCTION:**

Total knee arthroplasty (TKA) is one of the most clinically costeffective and successful treatments for severe knee osteoarthritis (KOA) and significantly improves the quality of life of patients with this condition.<sup>12</sup> A satisfactory result after TKA involves various elements, such as thorough surgical planning before surgery, strict selection for both patient and prosthesis, surgical technique, pain management, and functional exercise.<sup>3</sup> The investigation and identification of modifiable variables, which might allow for intervention before TKA, and this could potentially contribute to good clinical results and relieve the heavy economic burden on the healthcare system.<sup>3</sup> Surgical planning ought to identify potential factors related to adverse events following the surgery and avoid them as much as possible. Commonly known risk factors include increasing age, obesity, smoking, low nutritional status, as well as endocrine disorders. Some endocrine dysfunctions, such as thyroid disorders and diabetes, play a vital role in the occurrence of postoperative complications.4.7 Thyroid hormones are of great necessity to the growth and development of every tissue and organ because they are extensively involved in the regulation of the daily process of metabolism of almost every cell8. Hence, thyroid dysfunction can compromise recovery and have severe consequences for patients following surgery.<sup>8-9</sup>Hence we have taken up this study to evaluate the influence of subclinical hypothyroidism and postoperative outcome in subjects undergoing TKA.

AIM AND OBJECTIVES OF THE STUDY: The aim and objectives of our study is to find out the association if any between subclinical hypothyroidism and postoperative outcome in subjects undergoing total knee replacement.

MATERIALS AND METHODS: A prospective case-control study was conducted at our hospital Dept. of Orthopaedics Balaji Institute of Medical Sciences (Proposed) attached to Shri Balaji Hospital, Mowa, Raipur from December 2019-June 2020.

and subclinical hypothyroidism following ICD-9, those undergoing unilateral and primary TKA, having complete data including for clinical evaluations and examinations for comparison and a prospective study.

EXCLUSION CRITERIA: we excluded the subjects with baseline diagnosed hyperthyroidism, hypothyroidism, other causes of TSH elevations such as non-thyroidal illness and medications.

Diagnosis of SCH: Diagnosis of subclinical hypothyroidism is based on laboratory examination, completed by a Physician. The fasting plasma levels of TSH were tested in the morning in all patients. When the serum TSH level was higher than the normal laboratory reference range (TSH  $\geq$  5 mu/L) and serum-free T4 (FT4) was within the reference range, it met the diagnostic criteria. TSH and FT4 levels should be evaluated once again within 2-12 weeks to exclude the influence of laboratory errors or temporary elevation.

IEC, Consent and Definition of case and control: Following institutional review board approval at our hospital, a prospective, case-control study of 160 patients undergoing primary TKA between December 2019-June 2020 was performed. All included subjects provided written consent before the start of the study. The patients with subclinical hypothyroidism were selected as the case group and those without abnormal TSH as the control group. After the establishment of the cohort, two cohorts with the same distribution for age and gender were randomly selected. Whether subclinical hypothyroidism presented or not acted as the sole differentiating factor. Prior to the analysis, patients were matched in a 1:1 ratio based on age and gender.

Surgery Process: All TKA were conducted under epidural or general anesthesia. for the exposure of the knee, an anterior midline skin incision and a medial parapatellar approach were applied. Extramedullary instrumentation was used to achieve a target tibial cut of 90 relative to the mechanical axis in the coronal plane and of 3 to 5 relative to the posterior slope in the sagittal plane. Cementless as well as cruciate-retaining

**INCLUSION CRITERIA:** Diagnosed cases of osteoarthritis

prostheses with patellar resurfacing were used. The drainage was removed according to the drainage volume within 24 h after surgery. The tourniquet devices were set at approximately 55 kPa-75 kPa for around 40 min. Patients were given cefuroxime prophylaxis 30 min before the operation and within 24 h after the procedure. Prophylactic anticoagulant therapy was started within 12 h after the operation and lasted for at least 28 days. We encouraged patients to start weightbearing as soon as possible with the help of walkingassistance devices. Whether physiotherapists were needed depended on the functional performance of that particular patient. The X-ray films of all the patients showed that the alignment of the lower limbs in the weight-bearing position and the nonweight- bearing position was good, with sound component placement.

**Complications:** The primary outcomes included the occurrence of complications within 90 days. Perioperative complications were classified into medical complications and surgical complications. Complications that occurred in the patient within 90 days postoperatively were tracked through ICD-9 coding, recorded, and then compared.

**RESULTS:** We included a total of 160 subjects undergoing TKA. Out of 160 subjects 80 were cases subclinical hypothyroidism and 80 were euthyroid as controls. Out of 80 cases, 23 had mild SCH, 17 had normal FT4 on repeat test and 40 had severe SCH. Out of 80 subjects 64 subjects received preoperative treatment for SCH. The mean in cases and controls were  $56 \pm 14.45$  and  $57.7 \pm 13.98$  years respectively. Out of 80 cases 68 were females and 12 were males and in controls 66 were females and 14 were males.

Table 1: Shows the comparison of incidence of 90 day		
postoperative complications among subjects undergoing		
TKA with and without SCH		
Variable	Cases	Controls
Medical		
Acute postoperative anemia	5 (6.25%)	2 (2.5%)
Sepsis	1 (0.12%)	0 (0%)
Intubation	1 (0.12%)	0 (0%)
Pulmonary embolism	2 (2.5%)	0 (0%)
Pneumonia	3 (3.75%)	1 (0.12%)
DVT	1 (0.12%)	0 (0%)
ARF	0 (0%)	0 (0%)
Cardiac Complication	2 (2.5%)	1 (0.12%)
UTI	4 (7.5%)	2 (2.5%)
Surgical		
Periprosthetic Infection	1 (0.12%)	0 (0%)
Periprosthetic fracture	1 (0.12%)	0 (0%)

It is quite evident from the table that the patients with a diagnosis of subclinical hypothyroidism had an elevated risk of both medical and surgical complications postoperatively compared with those without this condition.

## DISCUSSION AND CONCLUSION:

Despite the high prevalence of subclinical hypothyroidism in the elderly there is limited research on its impact on postoperative results. The present study revealed that subclinical hypothyroidism was a risk factor for 90-day medical and surgical complications after TKA. This finding might arise from the direct and indirect influences of thyroid hormones on platelet maturation and function, the synthesis and action of coagulation factors, and the maintenance of blood viscosity.<sup>10</sup>

The effects of thyroid dysfunction on the clinical outcomes following TKA are various. In fact, thyroid dysfunction involves different conditions, including hyperthyroidism, hypothyroidism, subclinical hyperthyroidism, and corrected hyperthyroidism. Following on from previous studies demonstrating that hyperthyroidism and hypothyroidism could complicate surgical procedures and compromise recovery from TKA the present findings added the possibility that other thyroid dysfunctions also influence postoperative results.<sup>11-13</sup>

Subclinical hypothyroidism progresses to overt hypothyroidism in approximately 2%-5% of hypothyroidism cases annually. Specifically, patients with subclinical hypothyroidism, especially those with  $TSH \ge 10 \text{ mu/L}$ , without corrected subclinical hypothyroidism, without thyroid hormone supplementation, and with positive anti-TPO, could suffer greater risk of adverse events after TKA. At present, there is no recommendation for routine screening for thyroidal dysfunction in patients who have no history of this condition before TKA. Considering that the candidates for TKA are generally elderly and this condition overlaps with subclinical hyperthyroidism, it is necessary for orthopaedicians to perform a preoperative TSH assessment, especially for those aged >55 years, rather than only screening individuals with suspected thyroid disease or with known hypothyroidism (or hyperthyroidism), so that treatment can be given prior to TKA. Surgeons should postpone TKA, as an elective surgery for some patients with subclinical hypothyroidism, such as those with TSH  $\geq$  10 mu/L and positive anti-TPO, until appropriate treatments and adequate care can allow thyroid hormones to achieve euthyroidism.14

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