Epidemiological Trends in Candidates for Periacetabular Osteotomy in Japan: A Single-Center Retrospective Cohort Study

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¹Faculty of Medicine, Saga University, ²Department of Orthopedic Surgery, Faculty of Medic INTRODUCTION:

The aim of this study was to elucidate the longitudinal epidemiologic trends of candidates for transposition osteotomy of the acetabulum (TOA), a type of periacetabular osteotomy (PAO) characterized by a spherical osteotomy through a lateral trochanteric approach, at a single academic center in Japan.

METHODS:

Between 1999 and 2023, 743 patients (989 hips) underwent TOA for the treatment of hip dysplasia at our hospital. Exclusion criteria included concomitant other hip diseases (five patients), neuromuscular diseases (20 patients), or incomplete clinical and radiological records (three patients). A total of 715 cases (958 hips) were eligible for this study. Patient demographics, including age, sex, body mass index (BMI), and history of treatment for congenital hip dislocation, were obtained via medical chart review. Radiographic assessment included osteoarthritis stage (Tönnis classification) and lateral center-edge angle (LCEA). The time course changes in these parameters were analyzed using the Cochran-Armitage trend test and the Kruskal-Wallis test.

RESULTS:

The median age of the TOA candidates was 40 years (range, 11-60 years), with a gender distribution of 5% (37 patients) males and 95% (679 patients) females, and a median BMI of 22 kg/m² (range, 15-43 kg/m²). A total of 31% (222 patients) of the subjects had a history of treatment for congenital hip dislocation. The distribution of Tönnis grades was as follows: grade 1, 40% (390 patients); grade 2, 44% (418 patients); grade 3, 16% (151 patients). The median preoperative LCE angle was 10° (range: -45° to 24.9°).

No significant longitudinal trends in age, sex, or BMI were observed during the study period. However, there was a decreasing trend in the proportion of patients with a history of congenital hip dislocation (p < 0.001) (Fig. 1). The proportion of patients with Tönnis grade 0 increased, while those with grade 2 showed a decreasing trend (p < 0.001) (Fig. 2). The LCEA exhibited a tendency to increase, accompanied by a decrease in the proportion of cases with severe hip dysplasia (LCEA < 5°) cases and an increase in cases with borderline hip dysplasia ($20^{\circ} \le LCEA < 25^{\circ}$) cases (p < 0.001) (Fig. 3).

DISCUSSION AND CONCLUSION:

Significant longitudinal changes have been observed in the epidemiology of patients undergoing PAO at our institution over the past 24 years. Consistent with these epidemiological shifts, there has been a decline in the proportion of patients with a history of congenital hip dislocation and a trend toward a reduction in severe dysplasia. The proportion of patients with Tönnis grade 2 osteoarthritis decreased in line with the changes in surgical indications, taking into account factors contributing to PAO failure. Concurrently, the indication for PAO in borderline dysplasia has increased, reflecting the recent expansion of indications for PAO, which warrants further investigation of its efficacy.

In conclusion, this study reveals notable epidemiologic shifts in candidates for PAO over a 24-year period at a single academic center in Japan. These trends highlight the evolving surgical indications and underscore the need for ongoing evaluation of the efficacy of PAO, particularly in light of the expanding criteria for its use. Understanding these trends is essential to optimizing patient outcomes and tailoring surgical approaches to the changing demographic and clinical landscape.

FIGURE LEGENDS

Figure 1: Proportion of patients with a history of treatment for congenital hip dislocation (CDH) during the study period.

Figure 2: Distribution of Tönnis grade among patients during the study period.

Figure 3: Proportion of patients categorized by lateral center-edge angle (LCEA) classification during the study period. The classifications include severe (LCEA < 5°), moderate ($5^\circ \leq LCEA < 20^\circ$), mild ($20^\circ \leq LCEA < 25^\circ$), and borderline (LCEA $\geq 25^\circ$) hip dysplasia.

