Original Article

Correlation between Glans, Meatus, Shaft Score, and Penile Perception after Hypospadias Repair

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Aims: The aim is to analyze the correlation between the degree of hypospadias based on the Glans-Urethral Meatus-Shaft (GMS) score and penile perception after hypospadias repair using pediatric penile perception score (PPPS).

Settings and Design: Analytic observational study with a cross-sectional design.

Subjects and Methods: Thirty-two children with hypospadias were included in this study. The severity of hypospadias was assessed using GMS score. Postoperatively, PPPS was rated by two external pediatric surgeons.

Statistical Analysis Used: Correlation between GMS score and PPPS were analyzed using the Spearman test, \( P \leq 0.05 \): Significant.

Results: Mean-GMS was 8.69 ± 2.303 (mean-G 2.67 ± 0.858, mean-M 3.27 ± 0.942, mean-S 2.75 ± 1.055). Mean-PPPS was 10.19 ± 1.287. GMS score and PPPS had a very weak correlation (\( r = -0.227; \ P > 0.05 \)).

Conclusions: There was no correlation between GMS score and penile perception according to PPPS after hypospadias repair.

Keywords: Glans, meatus, shaft score, hypospadias, pediatric penile perception score, penile perception

Introduction

Hypospadias is a common congenital disorder with a prevalence of 1 in 200–300 male births.[1] Despite many improvements in hypospadias repair, low self-esteem and negative genital perception are still major issues felt by patients.[2] The severity of hypospadias is thought to be one of the factors that affect penile perception.[3,4]

To date, there is no universal definition of severe hypospadias. Location of the urethral meatus, degree of curvature, and urethral plate quality are among determinants.[5–7] Merriman developed Glans-Urethral Meatus-Shaft (GMS) score to assess hypospadias degree based on the quality of glans, meatus, and penile shaft.[6,7] Pediatric penile perception score (PPPS) is an objective scoring system focussed on evaluating penile perception after hypospadias repair.[1]

The aim of this study is to analyze the correlation between GMS score and postoperative penile perception according to PPPS in children with hypospadias.

Subjects and Methods

Ethical approval for this study was obtained from Medical Research Ethics Committee Dr. Hasan Sadikin General Hospital. All patients who completed their hypospadias repair for more than 6 months were included in this study. Preoperative GMS scores were recorded from the medical record. It consists of glans size and urethral plate quality (G), meatal location (M), and degree of curvature (S). Each of the three components is scored from one until four, with more unfavorable characteristics being assigned higher values with the lowest score of three and the highest of 12.

During the COVID-19 pandemic, routine long-term follow-up was done online by short messages and video calls. Standardized penile photographs (oblique, lateral, etc.) were taken for PPPS scoring.

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antero-polar with the penis held against the abdominal wall and antero-posterior with the penis held up straight positions) were taken. The penile perception was evaluated by two external pediatric surgeons using the PPPS based on those photos. PPPS consist of four questions including meatal position and shape, the shape of glans, shape of penile skin, and general cosmetic appearance. The perception was rated into four scales from very dissatisfied (one), dissatisfied (two), satisfied (three), and very satisfied (four), with four being the lowest (most dissatisfied) and 16 the highest (most satisfied). Correlation of GMS score and PPPS were analyzed using spearman test, \( P \leq 0.05 \) considered significant.

**RESULTS**

Thirty-two children with hypospadias were included in this study. The mean age at surgery was 5.06 ± 3.350 years (range 1–14 years). The mean GMS score of the patient was 8.69 ± 2.303 (G, M, S scores were 2.67 ± 0.858, 3.27 ± 0.942, 2.75 ± 1.055, respectively). The mean PPPS of the patients assessed by both surgeons was 10.19 ± 1.287.

The correlation between GMS score and PPPS is described in Table 1, which shows no correlation either between the mean GMS score and PPPS, as well as the G, M, S individual components and the PPPS.

**DISCUSSION**

Hypospadias patients in this study had older age compared to other studies which were usually aged 6–15 months at the surgery.\(^6,8\) The late presentation was maybe caused by socioeconomic problems, access difficulties to our provincial referral hospital which cover wide geographic region, and health insurance problems. However, Weber \textit{et al.} in their study showed that there was no difference in penile perception between patients who underwent repair before 18 months old and older.\(^9\)

GMS score is a concise method for describing the severity of hypospadias. The mean GMS score in this study was high (8.69 ± 2.303), as well as the three aspects of the score (Glans-Urethral Meatus-Shaft quality). This indicates the severe form of hypospadias in our patients. Our patients also had higher degree of hypospadias according to GMS score compared to Meriman \textit{et al.} and Arlen \textit{et al.} studies (mean GMS scores were 6.2 and 7 ± 2.5).

To our knowledge, this is the first study to analyze the possible correlation between GMS score and postoperative penile perception. However, prior studies found that proximal hypospadias was associated with poor penile perception due to less successful cosmetic results compared to distal ones.\(^10\) Patients with severe hypospadias also tend to have smaller glans diameters. Bush and Snodgrass in their study found that glans width <14 mm was associated with postoperative complications.\(^11\) Indeed, reoperative surgery will be associated with poor penile perception. Patients with proximal hypospadias also tend to have shorter penis and more severe curvature.\(^12,13\) Incomplete penile straightening and residual curvature will cause severe psychological problems.\(^10,14\)

Weber \textit{et al.} developed PPPS, an instrument to evaluate the penile perception of patients, parents, and surgeons.\(^1\) The evaluation was conducted at the clinic through a questionnaire filling and direct interview with parents and patients. However, regular long-term follow-up after hypospadias repair is still a problem, especially during the COVID-19 pandemic. We developed an online follow-up through short messages and video calls to obtain the evaluation. In this study, the PPPS was rated by the pediatric surgeons to assess penile perception from surgeons’ sight, as they mastered the anatomical anomaly of hypospadias and had certain expectations of postoperative features after hypospadias correction.

In this study, we found no correlation between the mean GMS score and mean PPPS. This finding was not in accordance with prior studies mentioned before in which the degree of hypospadias (based on meatal location) was associated with penile perception. Rynja \textit{et al.} also found that patients with severe hypospadias had a worse penile perception than the control group.\(^15\) However, Webber \textit{et al.} in their study found that there was no significant correlation between PPPS and the severity of hypospadias.

In this study, the glans and urethral plate aspect (G) of the GMS score was not correlated with the mean PPPS. It was in accordance with Ke \textit{et al.} study which showed that the size of the urethral plate did not affect the cosmetic outcome of hypospadias patients.\(^16\) Da Silva also found that penile shape and the quality and size of the urethral plate did not affect the postoperative outcome of hypospadias.\(^17\)

The meatus aspect (M) was also not correlated with mean PPPS. This result was in contrast to Liu \textit{et al.},
who concluded that the severity of hypospadias was associated with PPPS based on the location of the preoperative meatus.\textsuperscript{[18]} Keays \textit{et al.} stated that most patients whose surgery was successful had a preoperative condition that was categorized as distal hypospadias.\textsuperscript{[19]} However, the study of Arlen \textit{et al.} stated that meatus location alone was not statistically significant in relation to postoperative outcome.\textsuperscript{[20]} Rynja \textit{et al.} also stated that patients with distal and proximal hypospadias had the same level of satisfaction measured using PPPS.\textsuperscript{[15]}

Insignificant correlation also found between the shaft aspect of the GMS score (S) and mean PPPS. Arlen \textit{et al.} stated that shaft is the only aspect that has a statistical effect on the output, so it can be concluded that the greater the penis curvature will increase the risk of complications.\textsuperscript{[20]} Menon in his journal also said that men with a penile curvature of at least 20\textdegree, experienced dissatisfaction with the appearance of their penis.\textsuperscript{[21]} In this study, although the shaft score was poor, the PPPS was not poor. This was probably because one of the goals of hypospadias management, which is to form a straight penis was already achieved. The penile straightening and lengthening were completed so that recurrent curvature could be prevented.

Although our patients had severe hypospadias according to GMS score, but the mean PPPS was moderate. This shows that in these patients, postoperative penile perception is not always poor, and genital satisfaction may be achieved by implementing good technical and perioperative care.

This study has some limitations. The patients and parents PPPS had not been assessed. Clinical pictures were taken online, although they meet the standards for assessment, some had poor quality. The correlation of the GMS score and the six specific aspects of PPPS also had not been assessed individually. In conclusion, there was no correlation between GMS score and postoperative penile perception according to PPPS in children with hypospadias.

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\textbf{Conflicts of interest}

There are no conflicts of interest.

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