

EPIDEMIOLOGY:

Hypospadias affects approximately **18–20 boys per 10,000 male births in Europe**.

Prevalence varies worldwide, being highest in North America and lowest in parts of Asia and South America.

RISK FACTORS:

Hypospadias is linked to **genetic, placental and environmental factors**. Family history increases risk (up to 13% of cases). Low birth weight and small for gestational age (SGA) infants are more prone to develop hypospadias. Maternal conditions like hypertension, pre-eclampsia, and diabetes during pregnancy are also associated. Interaction between genetic background and endocrine disruptors may contribute to disease development.

CLASSIFICATION:

Based on location of the urethral meatus after release of skin:

- **Distal / anterior** – glanular or distal shaft.
- **Intermediate** / mid-shaft – penile.
- **Proximal / posterior** – penoscrotal, scrotal, or perineal.

Severity assessment should also consider:
Penile curvature, penile length, glans size/shape, and urethral plate.

DIAGNOSTIC EVALUATION:

Usually recognised at birth (except megameatus variant, seen after foreskin retraction).

Description should include: Meatal position, shape and width, presence of atretic urethra or divided corpus spongiosum, appearance of preputial hood and scrotum, penile size and curvature on erection.

Assess for associated anomalies: Cryptorchidism (2–6%) or acquired undescended testis (1–14%). If bilateral undescended testes, perform genetic and endocrine evaluation early to exclude differences of sex development (DSD).

Imaging studies are not routinely indicated, unless syndromic features are present.

MANAGEMENT:

While many distal forms may show satisfactory voiding and sexual outcomes. Long term follow up studies indicate that a proportion of patients may later experience spraying, obstruction, curvature, pain or aesthetic dissatisfaction, leading some of them to consider surgical correction in adulthood.

Indications for surgery:

- **Ectopic meatus causing ventrally deflected or spraying stream.**
- **Meatal stenosis.**
- **Ventral curvature of the penis.**
- **Incomplete preputial closure or penoscrotal transposition.**

Surgical goals: Straight penis, glandular meatus, and adequate skin coverage.

Pre-operative hormonal therapy: Used in proximal forms with small penis, narrow glans or urethral plate. Evidence of benefit is inconclusive. Possible side effects: impaired wound healing, increased bleeding.

Therapy should stop 1–2 months before surgery.

Age at surgery: Recommended age for primary repair: **6–18 months**. Age is not a risk factor for complications in prepubertal repairs. Adults have a higher complication rate than children.

Penile curvature: Present in most cases. Severity correlates with urethral abnormality. **>30° curvature generally requires correction.**

Stepwise approach: 1. Degloving and removal of ventral chordee tissue. 2. Dorsal plication or ventral lengthening depending on residual curvature.

Ventral lengthening reduces recurrence and avoids penile shortening.

Residual curvature may recur during growth → follow-up required.

Urethral reconstruction:

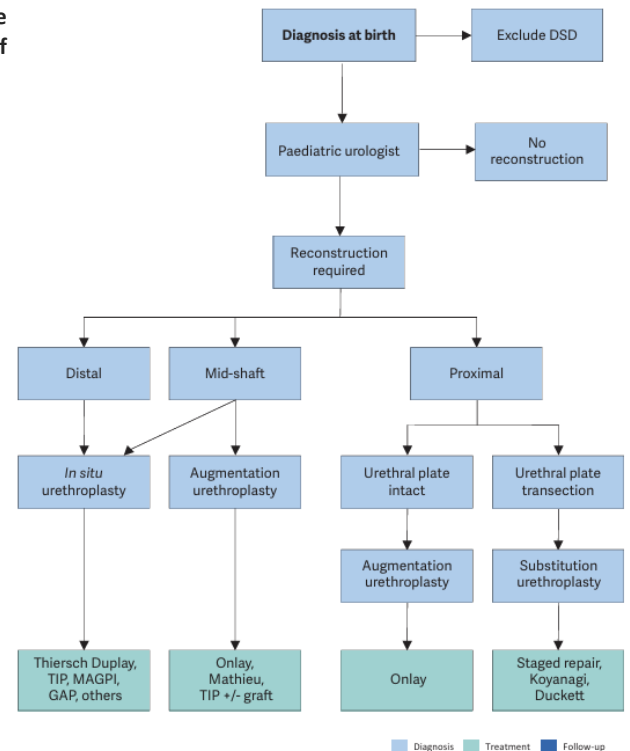
- Preserve the urethral plate whenever possible.
- **TIP (Snodgrass) technique** is preferred for distal and mid-penile forms.
- **Thiersch–Duplay** used when urethral plate is wide.
- **Onlay flap** for proximal forms or unsuitable plates.
- **Staged repairs (two-stage with grafts)** have lower complication rates than one-stage repairs.
- Adequate tissue coverage is key to prevent fistula (tunica vaginalis is preferred).
- Glans or wound dehiscence: 9–17%, linked to severe cases or small glans.

Outcomes and Complications:

Outcomes after hypospadias repair depend mainly on the severity of the defect, surgical history, surgeon experience, and chosen technique.

Distal forms achieve success rates of 85–90%, whereas proximal cases show higher complication rates (14–68%). Reoperations increase the risk of stricture and fistula, while staged repairs yield fewer complications than single-stage procedures. **The most common issues include fistulas (5–50%), meatal stenosis (5–15%), urethral strictures (8–13%), and glans or wound dehiscence (9–17%),** particularly in severe cases.

Regular uroflow monitoring is recommended, as obstructive patterns are frequent. Long-term satisfaction with penile appearance is generally good, though often lower among caregivers and surgeons, and penile length influences cosmetic perception. Overall, sexual function is satisfactory in most men, but severe forms or multiple surgeries may negatively impact psychosexual well-being and fertility.



DSD = differences of sex development; TIP = tubularised incised plate urethroplasty; MAGPI = meatal advancement and glanuloplasty incorporated; GAP = glandular approximation procedure; Mathieu = foreskin onlay flap; Snodgrass = preputial inlay graft; Duckett = preputial hood onlay flap.

Recommendations	Strength rating
Differentiate isolated hypospadias from disorders of sex development at birth.	Strong
Counsel caregivers on functional and aesthetic value of hypospadias corrective surgery and possible complications.	Strong
Use the treatment algorithm (Figure 4) to select the most appropriate surgical technique.	Strong
Correct significant (> 30 degrees) curvature of the penis.	Weak
Ensure long-term follow-up to detect urethral stricture, voiding dysfunction, recurrent penile curvature, ejaculation disorder, and to evaluate patient's satisfaction.	Strong