

Differences between series in the rates of incontinence, impotence and re-stricture can be explained by differences in patient selection (severe vs. less severe trauma), a mix of partial and complete ruptures, and differences in follow-up duration. Furthermore, these differences make the comparison with other techniques difficult, especially with urethroplasty [193, 289].

4.4.3.2.2 Early urethroplasty

Immediate urethroplasty within 48-hours after injury is difficult because of poor visualisation and the inability to accurately assess the degree of urethral disruption, due to extensive swelling and ecchymosis, which may result in extensive unjustified urethral debridement. Another problem is the risk of severe bleeding (average 3 L) following entry into the pelvic haematoma [242]. In addition, with high rates of erectile dysfunction (23%), urinary incontinence (14%) and re-stenosis (54%), urethroplasty within 48 hours is not indicated [242].

Early urethroplasty can be performed after two days and up to six weeks after the initial injury, if associated injuries have been stabilised, the distraction defect is short, the perineum is soft and the patient is able to lie down in the lithotomy position [294, 295]. This avoids a long period of suprapubic diversion with its discomfort and complications [294, 295]. As the results (complications, stricture recurrence, incontinence, and erectile dysfunction) are equivalent to delayed urethroplasty [295-297], early urethroplasty might be an option for patients fulfilling the above-mentioned criteria.

Lacerations (blunt or penetrating) at the bladder neck and prostatic urethra are a specific entity: they would never heal spontaneously, could cause local cavitation (presenting a source of infection) and compromise the intrinsic sphincter mechanism (with increased risk of urinary incontinence), they must be reconstructed as soon as possible [264]. For penetrating injuries with severe lacerations to the prostate, radical prostatectomy with bladder neck sparing could be required [285].

4.4.3.2.3 Deferred management (greater than three months after injury)

The standard treatment remains deferred urethroplasty [298]. In the case of a complete rupture, treated with an initial period of three months suprapubic diversion, obliteration of the posterior urethra is almost inevitable [263]. Endoscopic treatment of a complete obliteration is not successful and risky [242]. After at least three months of suprapubic diversion, the pelvic haematoma is nearly always resolved, the prostate has descended into a more anatomical position, the scar tissue has stabilised [294] and the patient is clinically stable and able to lie down in the lithotomy position [272, 294]. Associated life-threatening injuries often preclude early management of penetrating membranous urethral injuries. In those cases, suprapubic diversion with delayed urethroplasty is also advised [19, 28, 30]. Perineal anastomotic repair is the surgical technique of choice, but a combined abdominoperineal approach would be necessary in rare cases of concomitant bladder neck injury, recto-urethral fistula, multiple prior attempts to repair, or long distance between proximal and distal urethral stumps [299, 300].

An extensive overview of deferred urethroplasty can be found in the Urethral Strictures Guidelines including the need for extensive follow-up [301].

4.4.3.2.4 Iatrogenic posterior injuries

Urethral defects during transanal total mesorectal excision were repaired by direct suture repair via a transperineal approach in a small case series (n=32). Despite direct repair, 26% developed complications including urethral stricture, urethral dehiscence, recto-urethral fistula, and recto-perineal fistula. No evidence on other strategies is available [268].

4.4.3.3 Female urethral injuries

Emergency room management of PFUIs in females is the same as in males (section 4.4.3.2.1); however, subsequent management differs. Treatment options are [269]:

- **Early realignment:** This is associated with a high stricture and fistula rate.
- **Early repair (seven days or less):** Complication rate is the lowest with early repair; therefore, this strategy is preferred once the patient is haemodynamically stable [265, 269].
- **Delayed repair (more than seven days):** Delayed repair often requires complex abdominal or combined abdominal-vaginal reconstruction with elevated risk of urinary incontinence and vaginal stenosis.

The approach (vaginal, abdominal or combined) for early repair depends on the location of the injury [269]. Proximal and mid-urethral disruptions require immediate exploration and primary repair using the retropubic and transvaginal routes, respectively, with primary suturing of the urethral ends or urethral laceration. Concomitant vaginal lacerations are repaired (two-layer closure) trans vaginally at the same time [269]. Distal urethral injuries can be left hypospadiac since they do not disrupt the sphincter mechanism, but a concomitant vaginal