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Review

Ileal versus sigmoid neobladder as bladder substitute after radical cystectomy for bladder cancer: A meta-analysis

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HIGHLIGHTS

- Ileum and sigmoid neobladders were two preferable form of urinary diversion.
- Both ileum and sigmoid neobladders have advantages and disadvantages.
- This meta-analysis may be useful to choose the ideal bladder substitute for patients.

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ABSTRACT

Purpose: To evaluate and compare the functional outcomes of ileal and sigmoid neobladders in patients underwent radical cystectomy.
Methods: Relevant studies were identified by searching PubMed, Embase, and Cochrane Library. The studies comparing the functional outcomes of sigmoid neobladder (SN) and ileal neobladder (IN) in patients underwent radical cystectomy were included.
Results: A total of 12 cohort studies were included in this meta-analysis. From our analysis, more early complications were observed in SN group than in IN group (RR = 1.37, 95% CI: 1.03−1.81). Both daytime and nighttime continence rates were significantly better in IN group than in SN group (RR = 0.87, 95%CI: 0.81−0.94) (RR = 0.73, 95%CI: 0.60−0.90). More patients could spontaneous voiding in SN group than in IN group (RR = 1.12, 95%CI: 1.00−1.26). According to the urodynamic study, ileal neobladder exhibited bigger capacity (WMD = −84.93, 95%CI: −160.36 to −9.50), lower pressure at capacity (WMD = 11.18, 95%CI: 4.29−18.06), better compliance (WMD = −25.55, 95%CI: −32.45 to −18.64), and greater post-void residual volume(WMD = −23.48, 95%CI: −36.75 to −10.21); There was no significant difference in the max voiding flow rate or void volume between the two groups (WMD = −1.00, 95%CI: -3.73-1.73) (WMD = −27.00, 95%CI: 70.05-16.06). No significant difference was found in the serum creatinine between the two groups (WMD = −0.05, 95%CI: -0.12-0.03).
Conclusions: Ileal neobladder seems able to provide more favorable patient's satisfaction, while sigmoid neobladder may provide a better chance of spontaneous voiding. This meta-analysis may provide some useful evidences for urological surgeons to choose the ideal bladder substitute for patients underwent radical cystectomy.

1. Introduction

Orthotopic neobladder (NB) reconstruction using a bowel segment has been considered as the most preferable form of urinary diversion in patients underwent radical cystectomy. During the past two decades, a number of previous studies have shown favorable clinical outcomes in patients underwent this procedure

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[1–3]. To date, several types of bladder substitution, such as ileal, ileocecal and sigmoid segments, have been employed to achieve the ideal goal of a neobladder that functions as well as a normal urinary bladder [4,5]. There was a long search for the ideal bladder substitute, which should have adequate capacity and low pressure, preserve continence, empty with minimal residual urine, cause no or minimal metabolic disturbance, preserve the upper urinary tract and renal function, and provide an acceptable quality of life.

At present, orthotopic neobladder replacements using ileum or sigmoid are two commonly accepted procedures [5], which could avoid some disadvantages, such as nocturnal incontinence and stoma. Ileal neobladder (IN) is an excellent detublarized reservoir with low pressure and high capacity. The daytime and nighttime continence rates were 89.4% and 55.3%, respectively [6]. Sigmoid neobladder (SN) is also an accepted procedure, showing satisfactory spontaneous voiding rate and continence rate. Satisfactory results about this technique were described by the Minnesota group and others [7]. However, there is no definite decision concerning the ideal type of NB [8]. The differences in surgical procedures during the creation of NB have some impact on the postoperative clinical outcomes.

In recent years, several studies were performed to compare the functional outcomes of detubularized SN and IN, such as complications, continence, voiding status and urodynamic profile [5,8–12]. Regarding the different surgical procedures and different physiological properties of bowel segment, both have advantages and disadvantages. Here we performed a meta-analysis based on relevant studies to evaluate and compare the functional outcomes of ileal and sigmoid neobladders in patients underwent radical cystectomy.

2. Methods and materials

2.1. Search strategy

An extensive literature search was performed to identify all relevant studies comparing the functional outcomes of detubularized SN and IN in patients underwent radical cystectomy. PubMed, Embase and Cochrane Library were searched systematically for all articles without any restrictions. The following search terms were used in all possible combinations: (ileum OR ileal) AND (sigmoid OR colon) AND neobladder. This search strategy was performed iteratively until no new relevant article was found.

In addition, the reference lists of the found articles were also scanned in order to identify the relevant publications. Duplicate data or overlapping articles were excluded by examining the authors' names and affiliations of each publication. All searches were conducted independently by two authors. The results were compared, and any questions or discrepancies were resolved through iteration and consensus. The selection process of these articles was shown in Fig. 1.

2.2. Inclusion and Exclusion criteria

The data were included if the study met the following criteria: (i) comparing the functional outcomes of SN and IN in patients underwent radical cystectomy; (ii) describing the specific surgical technique and the definite methods for evaluating the functional outcomes of neobladder; (iii) providing sufficient data (the outcomes of surgical complications, continence status, voiding pattern or urodynamic studies). Exclusion criteria were as followed: (i) the patients with other diseases, such as tuberculous contracted bladder, a solitary functioning kidney; (ii) the purposes of the studies were to evaluate the other outcomes of neobladder, such as urinary cytokine levels, serum vitamin B12 concentrations; (iii) Reviews, editorials or commentaries. Two authors independently evaluated the quality of each study using the 9-star Newcastle-Ottawa Scale (NOS) [13].

2.3. Data extraction

Data were abstracted independently by two investigators, and disagreements were resolved by discussion. The following information was extracted: first author' name; year of publication; country of origin; study design; the total number of patients included and the number of patients with SN or IN; the age of subjects (mean or median); the follow-up time (mean or median); the outcomes of surgical complications, continence status, voiding pattern or urodynamic studies.

2.4. Statistical analysis

For the meta-analysis, the fixed-effects model or the random-effects model was considered according to heterogeneity. Data were measured as relative risk (RR) or weighted mean difference (WMD) and their associated 95% confidence intervals (CI). The I^2 statistic was used to evaluate heterogeneity. I^2 values > 50% represented the possibility of substantial heterogeneity. If no obvious heterogeneity existed, the RR or WMD was calculated by the fixed-effects model. Otherwise, the random-effects model was used. Finally, publication bias was assessed by Begg's and Egger's test. $P < 0.05$ was considered statistically significant. All statistical analyses were performed with STATA (version 9.0; Stata Corp, College Station, TX).

3. Results

3.1. Literature searches and study characteristics

The search strategy generated 263 references: Pubmed (n = 109), Embase (n = 152), Cochrane Library (n = 2). A total of 30 potentially eligible studies were identified by literature search. We excluded 5 studies reported the other outcomes of neobladder; 4 papers without clear description of grouping were excluded; we excluded 2 articles which reported the outcomes of neobladder in patients with tuberculous contracted bladder or a solitary functioning kidney; 3 articles included a small number of subjects; 2 articles was reviews.

Finally, we identified 14 full-text articles that met the inclusion criteria. Three articles reported the outcomes from the same participants. Thus, 2 of the three articles were excluded. Finally, a total of 12 studies were included in the analysis. The search process and summary of 12 studies were detailed in Fig. 1 and Table 1, respectively. All the 12 studies were retrospective cohort study. The included studies were published between 1995 and 2013, with a total study population of 956 participants.

3.2. Early and late complications

The data of early and late complications were available from 4 studies [8–11]. The early complications contained infection, ileus, pyelonephritis and urinary leakage. The total incidence was higher in SN group than in IN group (RR = 1.37, 95% CI: 1.03–1.81, $P < 0.05$; Fig. 2A). No significant heterogeneity (P for heterogeneity = 0.442, I^2 = 0.0%) or publication bias (Begg's test P = 1.00, Egger's test P = 0.931) was detected among those studies. The late complications contained uretero-enteric anastomotic stricture, vesicourethral stricture and neobladder stone. The results showed that there was no significant difference between SN group and IN group (RR = 0.93, 95% CI: 0.60–1.46, P = 0.761; Fig. 2B). No heterogeneity