

The user wants me to translate a Chinese academic paper title about urinary retention diagnosis and treatment. The title is “Progress in the Diagnosis and Treatment of Urinary Retention during 后印本”. Wait, there’s something odd here. The title ends with “during 后印本”. This seems like a mix of English…

**Authors:** NAN Ziqing, The user has provided a very short input: “LIN li”. This appears to be a name, likely Chinese. Let me analyze this:

1. “LIN” is the surname, which in Chinese would be “林” (Lín)
2. “li” is the given name, which could be “丽” (Lì), “莉” (Lì), “利” (Lì), etc.

However, the user hasn’t provided any context about what this is. Looking at the system prompt, it seems to be about translating academic papers from Simplified Chinese to English with specific requirements about preserving LaTeX, citations, and tags.

But the input “LIN li” is just two words. It could be: - A name that needs to be transliterated - Part of a larger document that got cut off - A test to see how I handle minimal input

Given the system prompt’s strict requirements about preserving tags and LaTeX, but the input contains none of these, I should consider:

1. If this is a name in a Chinese academic paper, it would typically be written as “Lin Li” or “Li Lin” depending on the convention (Western or Eastern order).
2. The capitalization “LIN li” suggests it might be in all caps for the surname, which is sometimes done in certain contexts.
3. In academic papers, Chinese names are often written with the surname first, either as “Lin Li” or “LI, Li” or “LI Li” .

Since there’s no tag, no LaTeX, no Chinese characters, and no context, I have a few options: - Return it as is: “LIN li” - Standardize it to proper academic format: “Lin Li” or “LI, Li” - Ask for clarification

But the system prompt says “Return ONLY the translated text for the given input (no explanations, no quotes, no headings you invent).” This suggests I should provide a translation/transliteration.

In Chinese academic contexts, names are typically: - Written in pinyin - Surname first (eastern order) - Sometimes capitalized: “LIN Li” or “LI Li”

The input “LIN li” has the surname in all caps and given name in lowercase. This is unusual but might be a specific formatting choice.

Given that the user is asking me to act as a professional scientific translator, and they’ ve provided what appears to be a name, I should probably: 1., The user has provided a very short input: “LIN li” . This appears to be a name, likely Chinese. Let me analyze this:

1. “LIN” is in uppercase, which could be the surname
2. “li” is in lowercase, which could be the given name

In Chinese names, the surname typically comes first. “LIN” (林) is a common Chinese surname. “li” could be: - 丽 (lì) - beautiful - 莉 (lì) - jasmine - 利 (lì) - benefit/profit - 立 (lì) - stand - 力 (lì) - strength - 黎 (lí) - dawn/surname

Since the user hasn’ t provided any context or tags, and this is just a name, I should translate it according to standard academic conventions for Chinese names in English publications.

Standard practice is to either: 1. Keep the original pinyin: “Lin Li” 2. Or use the Western order: “Li Lin”

Given that “LIN” is capitalized and “li” is lowercase, it seems like the user might want it formatted as “Lin Li” (surname first, capitalized). However, in most English academic papers, Chinese names are often written in Western order (given name first) when the author is publishing internationally.

But wait - the user hasn’ t provided any actual content to translate. They’ ve just given me a name. The instructions say to translate from Simplified Chinese to English with academic tone, preserve LaTeX commands, tags, etc. But there are no tags here.

Let me re-read the instructions carefully: - “Return ONLY the translated text for the given input (no explanations, no quotes, no headings you invent).” - “Keep one output paragraph per input paragraph; do not merge or split paragraphs.” - **“Maintain exact count and IDs of …tags”**

Since there are no tags in the input, and the input is just “LIN li” , I should just provide the English translation of this name. The most appropriate academic format would be “Lin Li” (keeping the original order but standardizing capitalization) or “Li Lin” (Western order).

Given that the original has “LIN” in all caps and “li” in lowercase, it might be indicating surname vs given name formatting. In academic contexts, Chinese names are

Date: 2023-10-09T00:00:00+00:00

## Abstract

The user wants me to translate a Chinese academic text about urinary retention during pregnancy into English. Let me analyze the requirements:

1. **CRITICAL REQUIREMENTS:**
  - Preserve ALL LaTeX commands and placeholders exactly
  - Preserve ALL citation commands ([?], ??, (??), etc.) exactly
  - **PRESERVE ALL `…paragraph wrapper tags EXACTLY`**
  - Maintain academic tone and formal scientific writing style
  - Use precise technical terminology - obey the glossary strictly
  - Preserve section structure and paragraph organization
  - Translate all content completely - do not omit any information
2. **OUTPUT RULES:**
  - Return ONLY the translated text
  - Keep one output paragraph per input paragraph
  - Maintain exact count and IDs of `…tags`
  - Do NOT add Markdown formatting unless present in source
  - Preserve original line breaks when meaningful
3. **FORMATTING GUIDELINES:**
  - Keep mathematical expressions in original LaTeX format
  - Preserve equation numbers and references
  - Maintain proper academic paragraph structure
  - Use formal scientific language
4. **Glossary:**
  - 机器学习 => machine learning
  - 深度学习 => deep learning

Looking at the input text: “The incidence of urinary retention during pregnancy is low which is mainly manifested as dysuria, frequent urination, incomplete urination, lower abdominal distension and abdominal pain and may induce severe complications and adverse pregnancy outcomes, so the early identification and treatment of urinary retention during pregnancy are crucial in clinical practice. Only by timely symptomatic and etiological treatment can the adverse outcome be avoided. This article made a review of the research progress of etiology, diagnosis and treatment, to provide diagnostic and therapeutic approaches and reference for clinical physicians.”

Wait, this input is already in English. Let me re-read the instructions. The user says “Translate from Simplified Chinese to English” but the provided text is already in English. This is confusing.

Let me check the text again: “The incidence of urinary retention during pregnancy is low which is mainly manifested as dysuria, frequent urination, incomplete urination, lower abdominal distension and abdominal pain and may induce severe complications and adverse pregnancy outcomes, so the early identifica-

tion and treatment of urinary retention during pregnancy are crucial in clinical practice. Only by timely symptomatic and etiological treatment can the adverse outcome be

## Full Text

### Preamble

#### Progress in the Diagnosis and Treatment of Urinary Retention during Pregnancy

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## Abstract

The incidence of urinary retention during pregnancy is low, primarily manifested as dysuria, frequent urination, incomplete emptying, lower abdominal distension, and abdominal pain, and may induce severe complications and adverse pregnancy outcomes. Therefore, early identification and treatment of urinary retention during pregnancy are crucial in clinical practice. Only through timely symptomatic and etiological treatment can adverse outcomes be avoided. This article reviews recent research progress on etiology, diagnosis, and treatment to provide diagnostic and therapeutic approaches and references for clinical physicians.

**Keywords:** Urinary retention; Pregnancy; Pregnancy outcome; Diagnosis, differential; Catheterization; Review

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Urinary retention is a condition in which the bladder fills with urine but cannot be emptied, often resulting from progressive difficulty in urination. While common in older men, urinary retention is rare in women. Although its incidence during pregnancy is low, urinary retention can cause serious complications such as recurrent urinary tract infections, acute renal failure, bladder rupture, miscarriage, and uterine rupture [1-3], jeopardizing maternal and fetal safety.

Therefore, early recognition and management are crucial. This study summarizes and analyzes the etiology, pathogenesis, diagnosis, and treatment of urinary retention in pregnancy based on cases reported in domestic and international literature, aiming to improve early diagnosis and clinical management of this condition.

## 1 Epidemiology

Urinary retention is rare in women, with an incidence of 0.07 per 1,000 [4]. The incidence of urinary retention during pregnancy is 4.7 per 1,000 [5]. Most current literature consists of case reports, with only one larger retrospective case-cohort study available [5]. Reported cases of urinary retention during pregnancy occur between 6 and 23 weeks of gestation, with the majority occurring between 10 and 18 weeks. A retrospective case-control study investigating the epidemiology and risk factors of urinary retention in pregnancy included 65,490 pregnant women from 1998 to 2011, identifying 308 cases. The peak period for urinary retention was 9 to 16 weeks of gestation, which was twice as high as other gestational weeks. The risk of acute urinary retention increased with maternal age, with patients over 35 years showing significantly higher risk than those under 20 years (OR = 2.62). The risks of acute urinary retention in women with preterm, full-term, and post-term pregnancies were 2.18%, 0.33%, and 0.46%, respectively. Preterm labor showed significant correlation with acute urinary retention (OR = 6.33) [5].

## 2 Risk Factors for Morbidity

### 2.1 Pregnancy-Related Factors

Whether pregnancy itself causes urinary retention remains inconclusive, but physiological changes in the urinary system during pregnancy correlate with its occurrence. During pregnancy, the glomerular filtration rate increases, leading to increased urine output. Progesterone causes smooth muscle relaxation and weakened ureteral peristalsis, resulting in mild dilation of the renal pelvis and ureters. In mid-to-late pregnancy, the enlarging uterus causes the bladder to rise and the bladder trigone to elevate, leading to poor urine circulation and aggravating ureteral dilation. The enlarged uterus or descent of the presenting part congests the pelvic space and reduces bladder capacity, resulting in frequent urination [6].

### 2.2 Uterine Factors

The most common cause of urinary retention in pregnancy is gestational uterine incarceration. Retroversion of the uterus is not uncommon, occurring in 15% of early pregnancies, with most cases spontaneously correcting by 14 weeks. However, when the uterus becomes embedded in the pelvic sacral recess and cannot rise into the abdominal cavity, it is termed gestational uterine incarceration,

with a prevalence of 1/3,000 [7]. Risk factors include endometriosis, adenomyosis, posterior uterine wall leiomyoma, and pelvic adhesions [3, 8]. Among these cases, 53.7% present with urinary symptoms, including urinary retention, frequency, urgency, and incontinence [9]. If urinary retention occurred in a previous pregnancy, it may recur in subsequent pregnancies [10]. YANG et al. [11] observed urinary changes in acute urinary retention caused by non-pregnant uterine fibroids and uterine tilting in pregnancy through ultrasound, revealing the mechanism: non-pregnant uterine fibroids or uterine tilting in pregnancy cause the cervix to shift forward and upward, compressing the lower bladder and covering the urethral meatus, thereby interfering with urination without causing urethral pressure or thinning. Daytime bladder pressure causes frequent urination, which prevents overdistension, and urine accumulates in the lower bladder when standing, preventing pressure on the urethral opening. In the supine position, the upper bladder prolapses, and urine accumulates in the upper bladder by gravity, causing the lower bladder to collapse. Combined with pressure from the upper bladder on the uterus, this indirectly aggravates pressure on the urethral meatus, becoming more pronounced with excessive fluid intake.

### 2.3 Other Factors

Rarer causes of urinary retention in pregnancy include uterine prolapse, cervical pregnancy, bladder tumors, meningiomas, Gartner's abscess, and bladder diverticula [2, 12-15]. These rare causes can be classified into three categories: (1) obstructive, such as abnormal bladder position and urethral obstruction; (2) neurological, such as cauda equina and spinal cord injuries; and (3) abnormal contraction of periurethral muscles, such as Fowler's syndrome.

## 3 Clinical Characteristics and Diagnosis

Clinical manifestations of urinary retention in pregnancy show diversity, dominated by urinary symptoms. The most common presentation is difficulty in urination, but also includes urinary frequency, incomplete emptying, followed by lower abdominal distension and abdominal pain. Other manifestations may include vaginal bleeding, back pain, perineal edema, and constipation. Vaginal bleeding in early pregnancy, abnormal fetal sac position, and urinary retention should alert clinicians to cervical pregnancy [14]. In gestational uterine incarceration, speculum examination reveals a significantly elevated cervix that is difficult to expose. Bimanual examination may detect extreme retroversion of the uterus compressing the rectum, with the uterine fundal height lower than expected for gestational age, making fetal heart sounds difficult to hear. Urinary retention is defined as the inability to urinate spontaneously. While no standard definition exists for residual urine volume, normal bladder capacity is 400-600 mL, with overdistension defined as >600 mL [16]. Generally, residual urine >100-150 mL is considered urinary retention requiring intermittent catheterization.

## 4 Diagnostic Methods

### 4.1 Imaging Examination

**4.1.1 Ultrasonography** Ultrasound is reproducible and noninvasive, allowing better assessment of intravesical conditions, renal morphology, and anatomical changes in the lower urinary tract, making it the preferred test for urinary retention in pregnancy. Transvaginal ultrasound is superior to transabdominal ultrasound in assessing lower urinary tract changes caused by pelvic masses [11]. Ultrasound can also assess residual urine volume and guide clinical decisions regarding timing of indwelling catheterization, reducing damage from repeated catheterizations [17].

**4.1.2 MRI Examination** MRI for acute urinary retention in mid-to-late pregnancy offers multidimensional imaging and a larger field of view, providing superior visualization of the uterus and surrounding intestinal, vascular, and bladder tissue contrast [17]. Although fewer MRI examinations are reported in the literature, MRI can be considered for further differentiation when diagnosis remains unclear. In cases of uterine incarceration, the placenta at the uterine base may be mistaken for placenta previa, which can be clarified by MRI.

**4.1.3 Cystoscopy** Cystoscopy visualizes the bladder and urethral shape and determines whether obstructive lesions such as compression are present, while also excluding bladder tumors. It can be considered when diagnosis remains uncertain.

### 4.2 Laboratory Tests

Urinary retention in pregnancy may be accompanied by urinary complications, including acute renal failure and urinary tract infection, though these are uncommon. Laboratory examination focuses on monitoring renal function and electrolytes, while performing urinalysis and urine culture to exclude urinary tract infection. In addition to urinary complications, attention should be paid to abnormalities in other systemic indicators.

## 5 Treatment and Prevention

### 5.1 Treatment

The first step in symptomatic treatment is timely bladder emptying to relieve symptoms, most commonly achieved through indwelling catheterization. However, prolonged catheterization increases the risk of urinary tract infection. The literature mentions that self-intermittent clean catheterization can be used, but patient compliance is low. Short-duration catheterization may lead to rapid recurrence of urinary retention. One study found that indwelling catheterization for 7 days compared with 3 days in pregnant patients with urinary retention could adequately drain urine, improve clinical efficacy, and not increase the risk

of urinary tract infection [18]. Secondly, the cause of urinary retention should be identified and treated as early as possible. For uterine incarceration in pregnancy, the uterus can be repositioned through manipulation, with high success rates before 15 weeks. If direct repositioning is difficult, uterine repositioning can be performed under general anesthesia or assisted by proctoscopy, with laparoscopic repositioning if necessary. For endometriosis, laparoscopic exploration can be performed. For uterine fibroid compression, myomectomy can be considered when necessary. Although cases of normal pregnancy to full term after myomectomy in pregnancy have been reported [19], surgery during pregnancy increases miscarriage risk and requires careful consideration. In cases of uterine prolapse, uterine supports can be placed. For unknown etiologies, multidisciplinary consultation should be performed when necessary.

## 5.2 Prevention

Avoiding prolonged urine holding and developing good voiding habits during pregnancy is very important. For women with posterior uterine tilt, attention should be paid to high-risk factors for urinary retention, such as difficulty in urination, abdominal pain, and distension symptoms before 14 weeks. Once urinary retention occurs, medical attention should be sought promptly. For larger uterine leiomyomas, especially posterior wall leiomyomas, surgical treatment may be considered prior to pregnancy. YANG et al. [11] recommend the following measures to avoid urinary retention caused by pelvic masses: (1) limiting fluid intake before bedtime, (2) changing from supine to prone position for a period before getting up to void, (3) leaning forward when starting to urinate, and (4) avoiding Valsalva maneuvers and using Crede's maneuver to initiate or maintain micturition.

## 6 Analysis of Literature Related to Urinary Retention in Pregnancy

This article summarizes and analyzes recently published literature on urinary retention in pregnancy, examining risk factors, clinical features, treatment outcomes, and recurrence to facilitate learning and reference for clinicians.

### 6.1 Literature Search

A computerized search was conducted on CNKI, Wanfang, and PubMed using the search terms "urinary retention AND pregnancy" in both Chinese and English. The search period was from 2010 to the present, yielding 11 Chinese and English articles [1, 8-9, 12-13, 17, 20-24] with a total of 19 patients. Data from all cases were analyzed and clinical characteristics were summarized, as shown in Table 1.

## 6.2 Clinical Characteristics of the Above Cases

- (1) The age of onset ranged from 22 to 42 years (mean 31.2 years), with patients  $\geq 35$  years accounting for 31.6% (6/19). Primigravid women accounted for 42.1% (8/19), while multiparous women accounted for 57.9% (11/19), making them the most common group. Disease onset occurred between the 6th and 23rd weeks of gestation, with 10 cases in early pregnancy and 9 in mid-pregnancy. Notably, 78.9% (15/19) of patients experienced onset between the 10th and 18th weeks of gestation.
- (2) The most common cause was uterine incarceration in pregnancy due to various reasons, including adenomyosis, posterior uterine wall fibroids, uterine prolapse, and posterior uterine position, accounting for 47.4% (9/19) of cases. The remaining causes included bladder neck leiomyoma, Gartner's abscess, and others.
- (3) Clinical manifestations were dominated by urinary symptoms. Seventeen of 19 patients presented with urinary symptoms, of which 88.2% (15/17) presented with dysuria. Other presentations included urinary frequency, abdominal distension, abdominal pain, vaginal bleeding, vulvar swelling, perineal pain, fever, malaise, constipation, back pain, left upper abdominal pain, and nausea. Palpation of a full bladder in the lower abdomen was the main sign.
- (4) Abdominal ultrasound was the primary auxiliary examination method.
- (5) Catheterization to relieve urinary retention was the primary symptomatic treatment, followed by etiologic treatment. The duration of urinary catheterization was recorded in 18 cases, with 7 cases having indwelling catheters for 1-10 days. Two cases had recurrence of urinary retention. One case had the indwelling catheter removed after 1 day, with recurrence occurring 2 days after removal. Another case had the catheter in place for 1 week and urinated normally after removal. Treatment of the underlying cause and sufficient duration of indwelling catheterization are the most important factors in preventing recurrence.
- (6) Complications and pregnancy outcomes: Acute renal failure and urinary tract infection occurred in 1 case each. There were 3 cases of preterm labor and 2 cases of spontaneous abortion, while the remaining pregnancies had good outcomes.

In summary, the incidence of urinary retention during pregnancy is low, with prevalence in women aged 22 to 42 years (mean 31.2 years), more common in multiparous women. The prevalent gestational weeks are primarily in early and mid-pregnancy. Uterine incarceration in pregnancy is the most common cause due to various factors. The main clinical symptom is difficulty in urination, with the primary sign being palpation of a full bladder in the lower abdomen. The main auxiliary examination is abdominal ultrasonography, which meets clinical diagnostic needs. Catheterization is the main symptomatic treatment,

while etiologic treatment and sufficient duration of indwelling catheterization are important measures to prevent recurrence. Clinical education should be strengthened during pregnancy, and pregnant women should avoid prolonged urine holding and develop good voiding habits to prevent urinary retention during pregnancy. Urinary retention in pregnancy can cause acute renal failure, urinary tract infection, miscarriage, and other serious complications. Early diagnosis and treatment are crucial, and clinical attention should focus on timely symptomatic and causative treatment to avoid adverse outcomes and ensure maternal and infant safety.

**Author Contributions:** Nan Ziqing was responsible for data collection, organization, and writing the paper; Li Lin was responsible for quality control and proofreading.

**Conflict of Interest:** The authors declare no conflict of interest.

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*Note: Figure translations are in progress. See original paper for figures.*

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