# Communications

# Recurrent Hyperparathyroidism

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Recurrence of surgically corrected primary hyperparathyroidism, after a long period of documented normocalcemia, is unusual.[1] Fulmer, Rothschild, and Myers in 1969 reported two cases and after reviewing over 1,500 surgically treated patients, found only 16 additional instances of late (over one year) recurrence.[2]

Some more recent reports state that the incidence of recurrent hyperparathyroidism is increasing, but is seen almost exclusively in patients with either familial hyperparathyroidism, the multiple endocrine adenomatosis syndrome, or parathyroid hyperplasia.[3,4]

Described here is a patient with primary hyperparathyroidism who was successfully treated by removal of a single large parathyroid tumor, but had recurrence of hypercalcemia several years later due to primary parathyroid hyperplasia.

## Case Report

The patient, a 52-year-old white male bartender, was admitted in April 1964 with complaints of fatigue, constipation, anorexia, polyuria, and weight loss. Past history was negative for peptic ulcer disease and kidney stones. Family history was negative.

Physical examination was unremarkable except for a palpable nodule of two to three centimeters in the region of the lower left lobe of the thyroid.

The serum calcium was 18.4 mg/100 ml; phosphorus, 3.0 mg/100 ml; and alkaline phosphatase was 6.3 Bodansky units (normal: 1.5 to 4.5 Bodansky units). The urinalysis, hematology, chemistries, electrolytes, and roentgenographic survey were all normal.

On April 13, 1964, neck exploration revealed a cystic tumor in the inferior portion of the left lobe of the thyroid. The right side of the neck was not explored. The tumor measured 5.5 × 3.7 × 2.9 cm, and weighed 26 gm. The histology was described as "parathyroid adenoma." The tissue is no longer available. The serum calcium level was 10.4 mg/100 ml at the time of discharge.

During July 1965 and February 1967, physical examination, serum calcium, phosphorus, and alkaline phosphatase were all normal.

The patient was not seen again until June 1973, when he presented with complaints of emotional irritability, episodes of vertigo, and a serum calcium value of 12.6 mg/100 ml at the time of examination. Admission to the hospital was recommended, but the patient refused because of financial reasons.

In May 1978, he appeared again with complaints of mild vertigo, emotional irritability, and subsequently was admitted. Physical examination was unremarkable. The patient's serum calcium value was 12.8 mg/100 ml; phosphorus value was 1.2 mg/100 ml; and his parathyroid hormone value was 951 pg/ml (with normal values up to 630 pg/ml); while values for chemistries, hematology, urinalysis, and $T_4$, and a roentgenographic survey, gastrointestinal series, cervical esophagram, thyroid scan, and ultrasonography were normal.

On May 16, 1978, the patient underwent exploration. No identifiable parathyroid tissue could be found after careful dissection of the left side. Two parathyroid glands were biopsied and then removed from the right side because frozen section histology suggested hyperplasia. The superior gland weighed 3.5 gm, and the inferior gland, 0.35 gm. Later histologic examination of the fixed tissue suggested parathyroid hyperplasia in both specimens, with the Armed Forces Institute of Pathology supporting this tissue diagnosis.

The serum calcium returned to normal by the second postoperative day. The patient was seen in follow-up 2 and 12 months after surgery. Serum calcium was normal on both occasions and the patient felt well.

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## Comment

The pre-operative localization of the parathyroid gland is extremely difficult and at times causes morbidity, for example, selective angiography of the parathyroid gland. Two recently described procedures, cervical esophogram[5] and parathyroid sonogram were non-contributory. These procedures, if positive, would be of great value as would any non-invasive anatomically locating procedures.

This case lends justification to the recent emphasis on thorough neck exploration and identification of all parathyroid tissue possible at the time of surgery for primary hyperparathyroidism.[1,6] Although the patient was said to have a single parathyroid adenoma at the time of his first operation, there is no way of being certain of this since the right side of the neck was not explored. Moreover, confident histologic distinction between parathyroid adenoma and parathyroid chief cell hyperplasia is usually impossible with presently available techniques.[1,3,4] This is especially true with frozen section technique employed while surgery is in progress.

Most authors agree that all parathyroid tissue, except approximately 150 mg of one gland, should be removed in cases of either primary hyperplasia or two or more "adenomas." Following a thorough neck exploration during which three small and grossly normal glands are identified by biopsy and only one large "adenoma" (parathyroid tumor) is found, probably only the single tumor should be removed. A minority and more extreme view is stated by Paloyan who feels that this "sub-total parathyroidectomy" should be done in virtually all cases of primary hyperparathyroidism regardless of gross appearance of the gland or histologic findings.[4] It is now generally accepted practice to identify and biopsy each parathyroid at the time of surgery in addition to removing a grossly obvious tumor.

### References


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# Preparation of Urine Teaching Slides


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The examination of urine in health and disease is a procedure that dates back to Hippocrates.[1] The first reported examination of urinary sediments was by Johannes Actarius, a Byzantine physician, in 1283.[1] He used containers called "urine glasses" to examine urinary sediments. Such urine glasses became the symbols for physicians' offices in the Middle Ages. The microscopic appearance of urine sediment was first described by Alfred Donné in 1837.[2] He described both crystals and cellular elements. In modern medicine the microscopic urinalysis is the most common laboratory procedure performed in the physician's laboratory. One study has shown that 60 percent of offices can perform this test.[3]

A method for preserving urine specimens as microscopic slides for prolonged periods of time is presented. These slides have been used effectively as teaching aids with family practice residents.


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## Method

The urine to be preserved is spun in the typical fashion (2,300 RPM for five minutes). The supernatant is then decanted leaving the final half cubic

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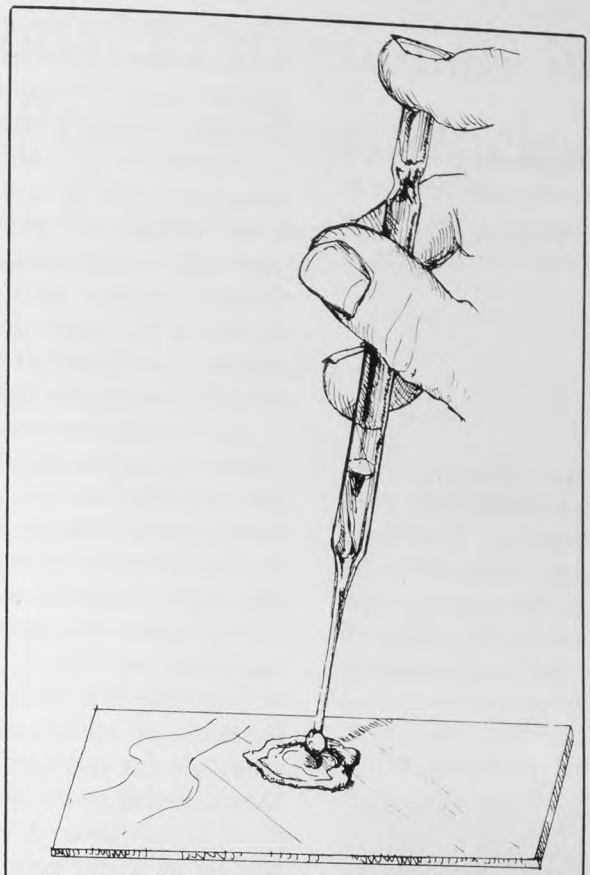

Figure 1. Place a drop of preserved urine sediment into the center of the well after the mounting medium has dried

centimeter of urine sediment. If cellular elements or casts are to be preserved, 2 cc of a two percent glutaraldehyde-saline solution is added. Glutaraldehyde is a common electron microscopy tissue preservative and is available as a 25 percent solution from scientific supply houses. If crystals are to be demonstrated, there is no need to add the glutaraldehyde solution. A urine sediment stain such as Sedi-Stain (Clay-Adams, Inc., New York, New York) or Kova Stain (ICL Scientific, Fountain Valley, California) can be added to highlight cellular elements or casts.

The microscopic slide is then prepared. A mounting medium such as Pro-Texx (Lerner Laboratories, Scientific Products, McGaw Park, Illinois) is drawn into a 2 cc syringe. A 25-gauge needle is placed on the syringe. The syringe with the 25-gauge needle is then used to draw a 1 cm circle in the center of the microscope slide. This produces a shallow-walled well of mounting medium for holding the urine sediment. Allow the mounting medium to dry for ten minutes, then pipette two drops of urine sediment into the circular well (Figure 1). Mounting medium is then placed outside the well wall in the shape and size of a cover slip. A large glass cover slip (22 × 33 mm) is preferable to the commonly used 22 × 22 mm size. The cover slip is then carefully placed on top of the well and the surrounding layer of mounting medium. The key to preparing these slides is to place the proper amount of urine sediment into the well. Approximately one to two drops of sediment are needed for a 1 cm sized well. Too much sediment causes it to flow over the wall of the well when the cover slip is placed. Too little sediment leads to air bubbles between the slide and the cover slip.

Slides were prepared for ten active sediments demonstrating a variety of crystals, casts, and cellular elements. These slides were reviewed regularly for periods of up to one year. Changes in the sediment morphology were verified by microscopic review by both a physician and a certified laboratory technician.

## Results

### *Crystals*

Triple phosphate, mono phosphate, and oxalate crystals have all been preserved and remain in pristine condition for up to one year. They show no evidence of deterioration and often increase in number with time.

### *Cells*

Red cells, white cells, urinary macrophages, renal tubular cells, and epithelial cells have been preserved in glutaraldehyde solutions. These have shown no changes in morphology with observation of up to one year. Red cells continue to show smooth concave shapes. White cells continue to show good nuclear detail. Macrophages retain their granules.

### *Casts*

Red cell, white cell, granular, and hyaline casts have been studied. Of these four, only the red cell casts have shown degeneration. After three months the red cell casts show increased granulation and loss of cell membrane integrity. They remain identifiable by their color and are not unlike red cell casts seen in a urine specimen that has stood for several hours between collection and examination.

### *Yeasts*

Candida buds and hyphae from vaginal wet preparations have been preserved. They have shown no deterioration with time.

## Discussion

The microscopic urinalysis is a common and clinically important laboratory test. Interpretation of a urinary sediment is a skill that all providers of primary medical care should master. Despite this fact there is little attention paid to it in medical school or residency program curricula. One reason for this is that fresh urine samples are not easily assembled for teaching purposes. Cells or casts that are kept for even a few hours undergo degradation because of bacterial overgrowth or cell wall degeneration. Crystals are often lost because of changes in urine pH over time as the urine sample is exposed to air. Microscopic photographs of urine sediments are used as a substitute for fresh urine samples in many educational situations. These fail to demonstrate the subtleties of the microscopic image, such as the birefringence of a crystal or the depth of a cast. Photographs also deprive the student of the opportunity of sitting with the microscope and learning its capabilities.

One method has previously been described for preserving urine sediments.[4] It suffers from the disadvantage that the sediment is kept in small bottles rather than the more convenient form of a microscope slide. A new slide must be prepared from the preserved sediment each time it is demonstrated. The sediment is, therefore, eventually used up.

A technique is described here which allows a physician or technician to prepare wet mount slides of urine sediments or vaginal specimens. A library of such slides can be kept for teaching purposes in the office setting. Such slides have been kept for up to one year with no specimen deterioration. In addition to its educational uses, this technique can be used to preserve sediments which contain unusual or unrecognized elements. The slides can then be reviewed at a suitable time with a pathologist or laboratory technician for a second opinion.

Urine sediment slides such as those described in this paper have been used as teaching aids in this family medicine residency program and a family nurse practitioner program. They have been found to greatly assist in teaching microscopic urinalysis. Controlled studies of their effectiveness as a teaching aid in medical education are needed to further validate the technique.

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