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The Mythical Danger of Rapid Urinary Drainage

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At 10:30 PM, Mr. Smith was admitted to the hospital with urinary retention. He had not voided within the past 24 hours and was understandably uncomfortable. His nurse inserted a Foley catheter and observed the urine as it began to fill the drainage bag. As the volume approached 1,000 ml she thought, "Should I clamp this catheter?"

Nursing texts and articles still warn of the dangers of suddenly emptying a distended bladder-- hemorrhage, syncope, sepsis, and shock-and recommend catheter clamping. They do not, however, provide evidence to support their recommendations.

We decided to investigate the question of how complete urinary drainage and threshold clamping affect the blood pressure, pulse, and blood loss of patients catheterized for urinary retention. Little research has been conducted on which is the better procedure; many of the past studies were relatively old, had been conducted on animals, or lacked research sophistication. Little evidence supported the use of threshold clamping as a necessary or even safe procedure.

Methods

Written, informed consent was obtained from six patients who had not voided for six hours or more. All appeared likely to have more than 1,000 ml of urine in their bladders (the amounts ranged from 1,050 ml to 1,950 ml). The patients were adults who were to be catheterized for urinary retention according to a physician's request. Excluded from the study were obstetrical patients, those with spinal cord injuries, and patients who had undergone urological procedures within the past six months.

Patients were randomly assigned to Group I—in which they were to have complete drainage—or Group II, threshold clamping. Blood pressure and pulse readings were obtained from all patients before, during, and 30 minutes after catheterization. Since the thresh-old clamping group had two drain-age phases, two different sets of blood pressures and pulse rates were measured.

Supine systolic and diastolic blood pressures and brachial pulse rate were recorded on all patients with an electronic blood pressure and pulse device.

While one investigator took each patient's blood pressure and pulse at predetermined intervals, the nurse caring for the patient inserted a Foley catheter, and a second investigator

took urine samples at one-minute intervals. Each sample was tested for blood using a Hemastix® reagent strip. One investigator and the patient's nurse verified the results.

Patients were monitored for any untoward reactions to the procedure, such as pain, diaphoresis, or frank bleeding, which would be expected to occur within 30 minutes of catheterization. Each patient's urine was also cultured for the presence of infection, which might explain any hematuria.

The research group used two techniques—the Celeration Line Technique and the Shewart Chart Procedure—to detect significant changes in BP and brachial pulse rate between the urinary retention and drainage phases in both the complete drainage and the thresh-old clamping subjects(1,2).

Design Details

We chose a single case experimental design approach because of the difficulty in obtaining large numbers of subjects, and because single case designs can produce convincing results (8).

Various single case experimental designs exist. Usually, single case designs have repeated dependent measures, baseline phases where no treatment is provided, and treatment phases in which an intervention is specified. In single case designs, the subjects act as their own controls. Clinical judgment is used to determine whether clinically significant changes occur from the baseline to the treatment phase—that is, whether the intervention caused the change.

Results without Clamping

According to the Shewart Chart Procedure, there were statistically (but not clinically) significant changes in either blood pressure or heart rate between the retention (baseline) phase and the complete urinary drainage phase in all three subjects. Evaluation of the data and mean values in each phase verified these results. There were no unexpected changes in blood pressure or pulse five minutes and thirty minutes after complete urinary drainage in any of the three patients.

A trace of blood was found in one patient's urine sample taken soon after drainage began. This was probably due to trauma to the urethra from inserting the catheter, because the urine cultures were negative for bacteria.

Results with Clamping

By using the Celeration Line Technique, we observed a rise in diastolic BP between the base-line phase and the first drainage phase in the patients whose catheters we clamped. Heart rates, on the other hand, fell slightly during the first drainage phase in all three of these patients. The changes in diastolic BP and heart rate between the clamping phase and the second drainage phase were statistically, but not clinically, significant. Verdict: No changes were clinically significant.

Although this was a small multiple single case study (see box for design), the results do provide some evidence of statistically significant differences in blood pressure and heart rate between urinary retention and drainage phases. However, these differences were not clinically significant and did not appear to be related to the procedure. The falls in blood pressure and heart rates were probably due to the patients' relief at having their bladders drained and to having the catheterization completed. Perhaps the blood pressure and heart rates were elevated in the first place due to anxiety over the catheterization procedure and to the discomfort of the distended bladder.

Unfounded Fear

These results at first appear to contradict the findings of earlier studies in which researchers found, in both animals and humans, that complete bladder drainage produced no evidence of subsequent changes in blood pressure and heart rate (3-7). If the drops in blood pressure and heart rate were due to blood loss, bladder decompression, or to bladder damage, however, there would have been other clinical signs to support these conditions such as increased heart rate, diaphoresis, or changes in mental status. There was, however, no significant blood found in the urine samples and none of the patients exhibited signs that warranted clinical intervention. These observations support the findings of previous researchers who have concluded that any bladder damage they detected was due to infection and to the length of time urine was pooled in the bladder and not to bladder decompression.

The results of this small study appear to confirm the much earlier ones cited. We invite readers to replicate this small study, and we conclude that complete drainage of a distended bladder is likely to be more comfortable, and certainly seems at least as safe, as threshold clamping.

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