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## EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY (ESWL): PATIENT INFORMATION

You have undergone extracorporeal shock wave lithotripsy, a revolutionary technique used for the treatment of kidney and ureteral stones. First performed in the United States in 1984, it is truly one of the greatest medical advances of all time, and has tremendously reduced the need for the old fashioned open stone surgery. ESWL uses high pressure shock waves directed at the kidney stone under x-ray guidance that will result in the fragmentation of the stone into tiny fragments that can then be passed through the urinary tract.

Several factors will impact the results of your ESWL: stone size, *location*, and *composition*. In general, the best results of ESWL are achieved with smaller stones. When stones are of very large size or are multiple, the results from ESWL are less favorable. Large stones may require several ESWL procedures. Location is another important factor. In general, stones located within the kidney itself have the best prognosis for treatment with ESWL and those in the ureter are typically more difficult to fragment. A third important factor is the composition of the stone itself. In general, uric acid stones, struvite stones, and calcium oxalate dihydrate stones fragment readily whereas cystine, calcium oxalate monohydrate stones, and calcium phosphate dihydrate stones are more difficult to fragment.

Although ESWL has provided a great number of patients suffering from stones a wonderful alternative to the more invasive forms of therapy, there are limitations to this procedure. **It is fundamental to understand that ESWL will result in the fragmentation of the stone into sand-like particles but that these particles must then pass down the ureter into the urinary bladder and out the urethra.** It is not uncommon to have some retention of fragments in the lower aspect of the kidney and it may several months to pass all the fragments. It is important to know that some retained stone fragments may not pass spontaneously and may require a secondary ESWL. During the passage of stone fragments, it is not uncommon to have colic-like pain which may require pain medication to control. Less than 5% of patients will develop a "steinstrasse," a German word defined as "street of stones." This is a condition in which multiple stone fragments line up in the ureter and this sometimes may require ancillary procedures such as ureteroscopy. Although most patients will have transient blood in the urine, an occasional patient may have a significant amount of bleeding in the tissues surrounding the kidney. It should also be mentioned that ESWL carries with it a theoretical risk of inducing high blood pressure; however, this has never been clearly proven. Despite these shortcomings, ESWL provides a means of successful treatment of most kidney stones and many ureteral stones in a very non-invasive fashion requiring no incision and no hospital admission.

ESWL is an outpatient procedure performed under intravenous sedation monitored by an anesthesiologist. On occasion, general anesthesia will need to be employed in order to satisfactorily target the stone. An x-ray monitoring unit is used to pinpoint the precise location of the kidney stone. Shock waves are directed at the stone, causing it to disintegrate into small particles. The procedure usually takes between 30 and 45 minutes and typically will involve approximately 2400 shocks. The disintegration of the stone is periodically monitored utilizing x-ray guidance.

Following ESWL, you will go to a recovery area and when you are fully awake and alert, you will be able to be discharged. There may be some discomfort following ESWL, particularly as the stone particles are eliminated. You will be sent home with a prescription for pain medicine and a prescription for antibiotics. It is very common to have blood in the urine and a bruise in the area of the treatment. Typically, you may resume normal activities within only a few days.

**Careful office follow-up after ESWL is mandatory. You will be followed with x-rays of the abdomen to ensure proper passage of the stone fragments and particles, the first of which is usually done about two weeks or so after the procedure. Usually within 6 weeks after the ESWL, some form of imaging study of the urinary tract is performed to document satisfactory kidney function and absence of residual stones, typically a renal ultrasound. It is important to collect your stone fragments via the strainer provided so that they can be analyzed for composition to help prevent future recurrences.**

Prior to being discharged, you will be given a prescription for antibiotics, pain medicine, and the follow-up X-ray. It is important to complete the course of the antibiotics in order to avoid a urinary infection. The pain medication can be used on an "as needed" basis. It should be noted that narcotic pain medications have many side effects including nausea, constipation, and a general feeling of being "unwell." If you are experiencing such symptoms, it may be beneficial to switch to an over the counter anti-inflammatory such as Motrin or Advil.