Understanding the OptiCouple® Technology

A Summary of Peer-Reviewed Articles

February 2018 - Issue #2

Dornier MedTech

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Editorial

Dear Doctor,

Extracorporeal Shock Wave Lithotripsy (ESWL) has been the cornerstone of non-invasive kidney stone management for over four decades. As the Medical Officer of Dornier MedTech, I would like to take this opportunity to introduce to you this issue of "Understanding the OptiCouple Technology". It is a collection of summaries of some very interesting and important peer-reviewed articles published on OptiCouple® technology.

As the innovators of ESWL technology, we at Dornier MedTech continuously strive to improve and enhance the efficacy and safety of our ESWL devices. OptiCouple technology, Optical Coupling Control (OCC), is a result of these efforts to continuously make our devices even better. It significantly improves stone free rates and lowers retreatment rates. Our latest offering, the Dornier Delta® III lithotripter, combines this unique technology with even more powerful imaging for improved stone visualization, greater penetration depth to treat more stones in more patients, and greater efficiency with time saving features. Let's have a look at some of the important recent evidence published on OptiCouple technology. We have made a sincere attempt to present the most important information in a concise and lucid manner with figures where appropriate. I am sure you will find this compendium very useful for your clinical practice.

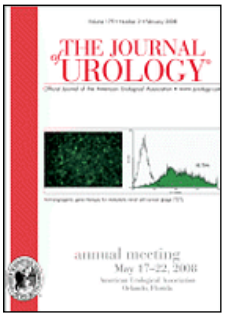
Happy reading!

Yours sincerely,

Dr. Dipen Jagatiya
M.B.B.S, M.P.H
Medical Officer
Dornier MedTech

CLINICAL SUMMARY

This clinical summary reviews the following article from the Journal of Urology.



Journal of Urology (2012) 187(1), 157-163

Monitoring the Coupling of the Lithotripter Therapy Head with Skin During Routine Shock Wave Lithotripsy with a Surveillance Camera

Christian Bohris, Alexander Roosen, Martin Dickmann, et al.

Visual Surveillance Can Improve the Quality of Coupling

Background

A meagre 2% coverage by air pockets can reduce stone fragmentation by up to 40%. Although an inline ultrasound system is utilized to ensure bubble-free coupling, very few lithotripters can visually monitor the quality of coupling.

Objective

- To determine the quality of coupling during routine extracorporeal shock wave lithotripsy (ESWL) and the impact of air bubbles on stone disintegration
- To assess if visual monitoring of coupling can improve ESWL

Methods

A total of 30 patients who underwent ESWL between Feb 2010 and Jan 2011 were included in the study. A DoLi SII lithotripter fixed with a video camera in its water cushion was used to evaluate the quality of coupling between the water cushion and the patient skin. Four urologists performed the procedure who were watched by an observer. Only the observer could view the coupling and help in correcting the coupling if needed. Three different gels – Sonogel, Litho-Clear HV and a custom-made gel were used.

Results

Of the 30 patients, 26 had kidney stones and 4 had ureteral stones. X-ray was used in 20 patients and isocentric ultrasound was used in 10 patients for stone localization.

Gel

- Sonogel and LithoClear had a significantly higher viscosity as compared to the custom-made gel at 20 and 37 degree Celsius.
- Custom-made gel developed bubbles easily when the bottle was turned upside down.
- Sonogel and LithoClear did not flow down when the cushion surface was rotated. However, the custom made gel did flow down.

Quality of coupling

- Bubble entry/formation happened mostly when the cushion touched the skin, immediately at the first coupling or after an intermediate decoupling. Repositioning was an important reason for decoupling.
- Custom made gel with low viscosity had better results (7/10) in terms of A_{air} <5% as compared to LithoClear (3/10) and Sonogel (0/10).

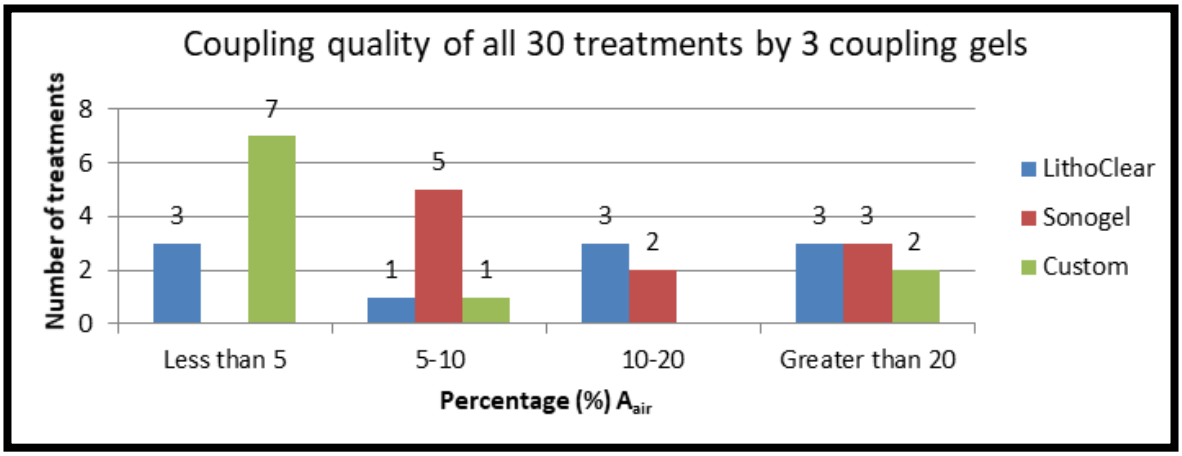


Figure 1. Coupling quality of all 30 treatments by 3 coupling gels; A_{air} = coupling area air ratio

Shock wave requirement for fragmentation during model stone tests

- A_{air} of 5% and 20% were associated with about 1.2 times and 3 times more shocks respectively as compared to bubble free coupling.

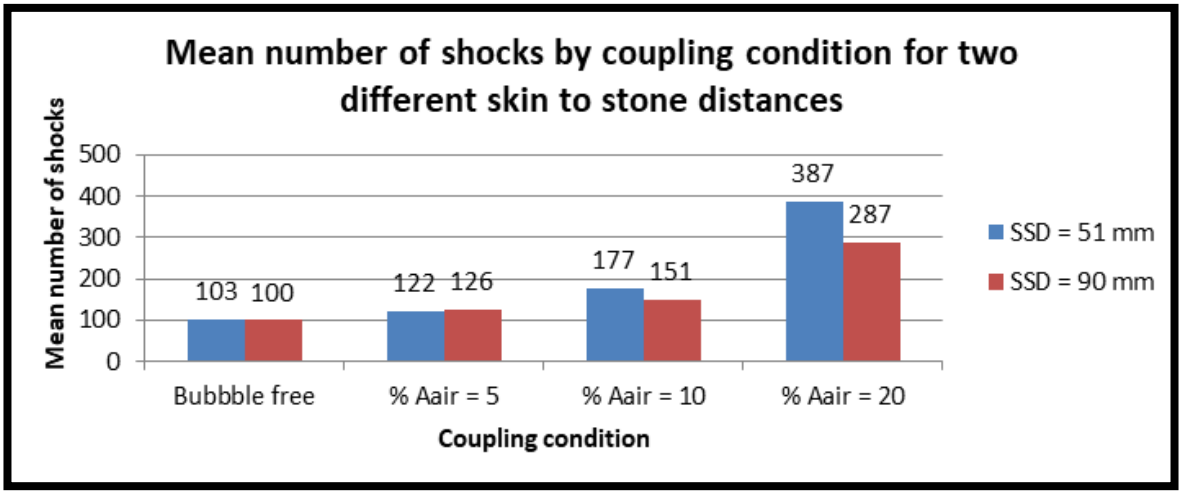


Fig 2. Mean number of shocks by coupling condition for two different skin-to-stone distances (SSD); A_{air} = coupling area air ratio

Conclusion

In this study, only 10 treatments out of 30 achieved good coupling. Use of a video camera to visually monitor the coupling can improve the quality of coupling.

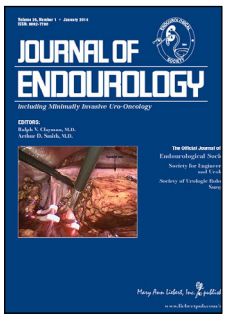
Reference:

Bohris C et al. (2012) Monitoring the coupling of the lithotripter therapy head with skin during routine shock wave lithotripsy with a surveillance camera. J Urol. 2012 Jan;187(1):157-63. doi: 10.1016/j.juro.2011.09.039. Epub 2011 Nov 17

The full article can be accessed after purchase by clicking this link:

CLINICAL SUMMARY

This clinical summary reviews the following article from the Journal of Endourology



Journal of Endourology (2014) 28(11), 1368-1373

Optical Coupling Control: An Important Step Toward Better Shockwave Lithotripsy

Geert G. Tailly, MD, and Martine M. Tailly-Cusse, RN

Optical Coupling Control Improves Shock Wave Lithotripsy

Background

The disintegration capability of a lithotripter is affected by the presence of air bubbles in the coupling interface which affects the transfer of energy. Optical coupling control (OCC) allows visualizing the air bubbles in the coupling area and removing them.

Objective

- To assess if visualizing and removing air bubbles from the coupling interface using a video camera fixed in the therapy head of the lithotripter helps achieve completely bubble-free coupling.
- To assess if bubble-free coupling achieves comparable treatment results with fewer shock waves at a lower energy level.

Methods

A Dornier Gemini® lithotripter was used. The therapy head was fixed with a video camera and light-emitting diode-light to check for air bubbles. The air bubbles were removed by gently swiping a hand between the patient and the inflated water cushion. Treatment followed the latest European and American guidelines and was administered using a validated protocol by a single urologist. The patients received 80 SW/min at a fixed pulse repetition frequency. Voltage was stepped up in all treatments.

The results of 198 cases with OCC performed between Oct 2012 and Sep 2013 were compared with 275 patients with ‘‘blind’’ coupling performed between Apr 2011 and Apr 2012.

Results

Patients in the OCC group needed 25.4% fewer shock waves for renal stones and 25.5% lesser shock waves for ureteral stones. The total treatment time also reduced by a similar percentage.

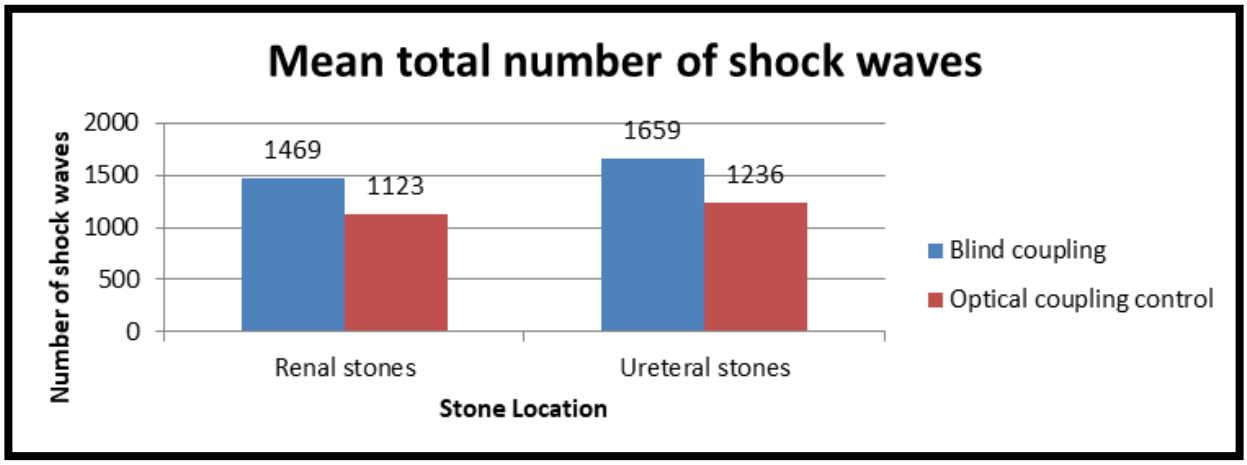


Figure 1. Mean total number of shock waves required in each group by stone location

The energy level in the OCC group also reduced for both renal and ureteral stones by 23.1% and 22.5% respectively. The total accumulated energy reduced by 42.9% for renal stones.

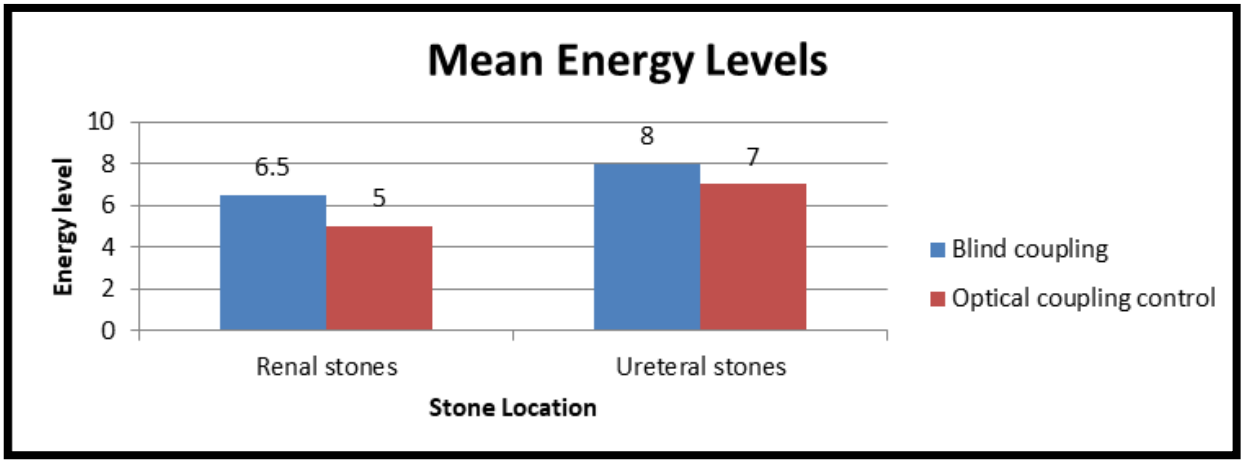


Figure 2. Mean energy levels in each group by stone location

The efficiency quotients were comparable for both renal and ureteral stones in both the groups.

Conclusion

Optical coupling control reduces the mean number of shock waves, the mean energy levels and the total treatment time for renal and ureteral stones. By reducing the total shock wave energy required, it makes shock wave lithotripsy safer and more efficient.

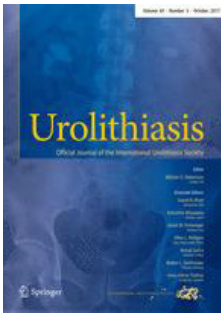
Reference

Tailly GG and Tailly-Cusse MM (2014) Optical Coupling Control: An Important Step Toward Better Shockwave Lithotripsy. J Endourol. 2014 Nov;28(11):1368-73. doi: 10.1089/end.2014.0338

The full article can be accessed after purchase by clicking this link:

CLINICAL SUMMARY

This clinical summary reviews the following article from the journal Urolithiasis



Urolithiasis (2016) 44: 539-544

A new optical coupling control technique and application in SWL

Jian Lin Lv

Newer advances – Optical coupling control for ESWL

Background

Modern Lithotripters use gel or oil to couple the cushion of the treatment head with the skin of the patient. Any air which gets trapped at the coupling interface can affect the quality of stone fragmentation by interfering with the transmission of shock waves to the patient. The therapy heads of the latest Dornier devices come fixed with a video camera and a LED light – Opticouple® imaging technology which helps to detect air bubbles and imperfect coupling.

Objective

To compare the outcomes of optical coupling control (OCC) with blind coupling during treatment of renal stones with extracorporeal shock wave lithotripsy (ESWL)

Methods

A total of 336 patients with upper urinary tract stones were randomized into an optical coupling control (OCC; Group A – 169 patients) and a blind coupling (Group B – 167 patients) group between January 2014 and February 2015. A Dornier Compact Delta II UIMS was used. The same urologist performed all the procedures. The shock waves were delivered at 70 shocks per minute and the power was gradually increased to 100%. In the OCC group, air pockets were removed under visual control from the video camera by gently swiping, repeatedly if needed, a hand between the patient and the inflated water cushion. It is preferable to apply the ultrasound gel from a large container instead of a squeeze bottle to avoid air bubbles. Stone free rates at 3 months were measured.

Results

The stone characteristics were similar between the two groups (p=ns). The overall stone free rates at 3 months were significantly higher in Group A for both kidney stones (78.2% vs 62.8%; p=0.027) and ureteral stones (81.7% vs 67.9%; p=0.042). The treatment results were also stratified by stone location and they were significantly better in Group A for all stone locations ($p<0.05$) (Figure 1, 2 and 3).

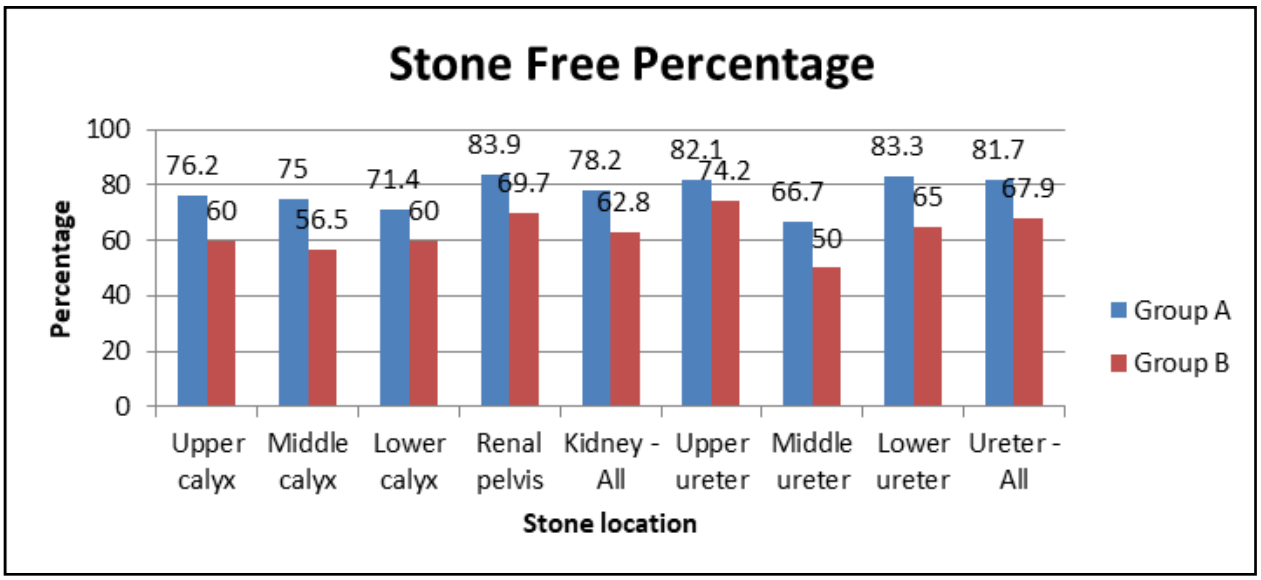


Figure 1: Stone free percentage by location

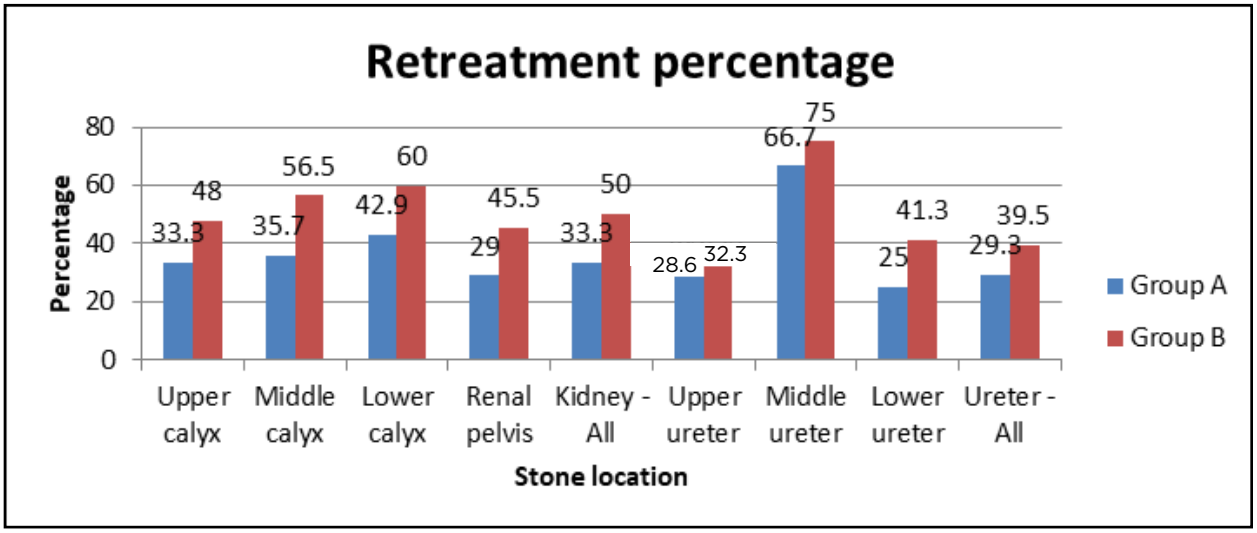


Figure 2: Retreatment percentage by stone location

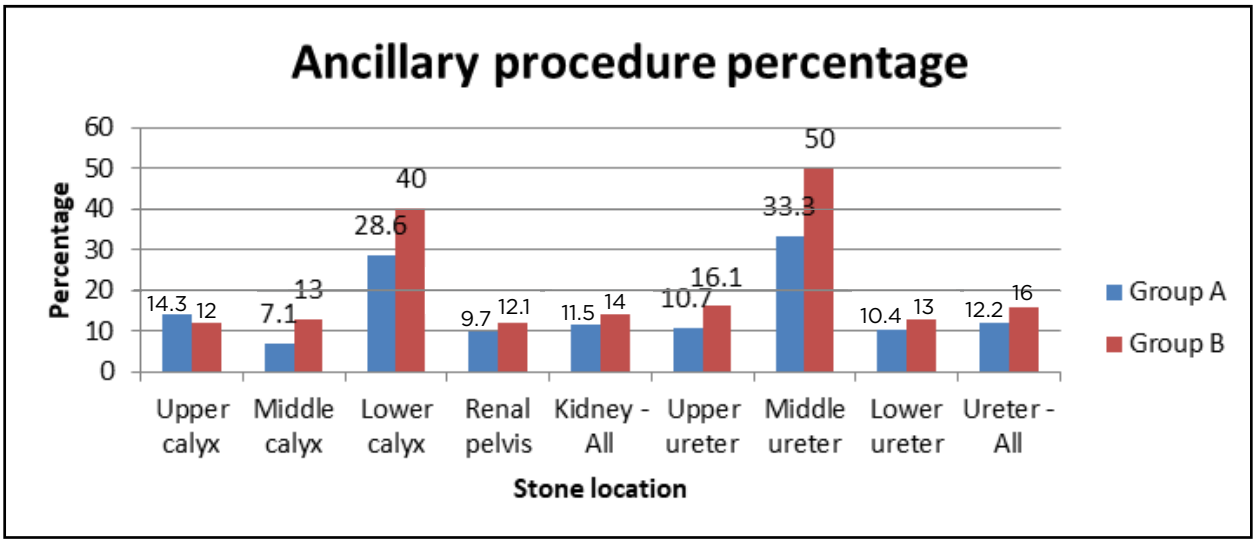


Figure 3: Ancillary procedure percentage by stone location

Group A also needed significantly lesser mean number of shocks (1900±363 vs 2400±320; p=0.013), lesser treatment time (p=0.021) and lesser energy levels (1.6±0.8 vs 2.3±1.2; p=0.036) compared to Group B. Mean fluoroscopy time was less with Group A but not statistically significant (1.5±0.7 vs 1.8±0.8; p=0.067).

Conclusion

The new Opticouple coupling control technique is associated with significantly better outcomes. It improved the efficiency of shock wave transmission and reduced energy loss leading to optimization of treatment outcomes.

Reference:

Lv JL. (2016). A new optical coupling control technique and application in SWL. Urolithiasis. 2016; 44(6):539-544. https://doi.org/10.1007/s00240-016-0874-9.

The full article can be accessed after purchase by clicking this link: