AVICENNA ROBOFLEX
World’s First Flexible Ureteroscopy Robot and Robotic Retrograde Intra-Renal Surgery (RIRS) - Lithotripsy
Urinary Stones

- Urinary stone disease is seen very common everywhere
- It is still possible to encounter very big stones already developing
- According to the international guidelines: stone treatment should be evaluated according to the stone’s place, size and type.
- Non invasive SWL and minimal invasive endoscopic treatments totally replace open surgery.
Retrograde Intra Renal Surgery (RIRS)

- Developments in medical technology, enables smaller diameter flexible endoscopes than flexible gastroscopes/colonoscopes called as flexible uretero-renaloscopes which can be inserted inside the ureter with the diameter less than 3 mm.
- These flexible ureterorenoscopes (fURS) have been developed and become widespread in endourology field in recent years with the introduction of the RIRS treatment method which allows the laser to pass through the bladder and ureter through natural channels (without puncturing or cutting the patient) and pulverizing the stones in the pelvis and calyx in the kidney.
Application of RIRS Method by use of fURS:

- Treatment of kidney stones by flexible ureteroscopy is becoming widespread and the endourologists attempts to treat larger stones with RIRS and present those results on in recent congresses.

- However, manipulation of the flexible uretero-renaloscopes by hand is extremely difficult and tiresome. The surgeon should wear the lead apron and sterile surgical gown during the RIRS. Once the stone has been detected, the surgeon should keep his position in standing and should dust the stone with Holmium Laser by precise movements for 30-60 minutes in that extremely difficult position. That is limiting the use of this method for larger stones. Dusting large stones with the laser can sometimes takes as long as 2 hours.

- The learning curve of RIRS is very long and to become experienced in flexible ureteroscopy requires many cases (generally 30-40) and costs a lot money because of misuse of endoscopes.
Why is it necessary to use a robot for fURS in RIRS?

The use of robots is rapidly becoming widespread throughout the world in all areas of surgery. Leading urologists also say that 'robotic surgery is the future of endo-urology'.

- **Robot for Patients:**
  - It enables the treatment without puncturing or cutting the patient thru natural channel and return to the daily life by rapid healing.
  - It increases the success of stone free rate in first session, enables to shorten the duration of treatment.
  - It reduces the exposure of radiation applied to patient.

- **Robot for Hospitals:**
  - Robotic treatments are extremely attractive to patients looking for new technologies; It increases the number of foreign and domestic patients, especially health tourism. It increases the prestige of the hospitals.
  - Extremely expensive and fragile endoscope is protected by the robot, and the lifetime will be increased approximately 10 times longer compared by hand which is 20-30 cases according to the literature. This reduces the operation cost.
  - Because of it’s shorter learning curve, the number of surgeons who can do the RIRS increases, and it enables that RIRS can be applied even in peripheral hospitals. So it reduces the gap between regions.

- **Robot for Surgeon:**
  - Sitting on the ergonomic control console, allows surgeon to work without fatigue, loss of concentration
  - Reduce exposure to radiation by working away from the radiation zone
  - Simplifies realization of orientation by 3D simulation of endoscope and kidney
  - It shortens the learning curve of the RIRS method and provides 24 times more precise manipulation than manual precision
  - It allows surgeons to make much more operations without tiring than manually
  - Provides easy, safe and successful treatment of even larger stones
Why called as Avicenna(Ibn-i Sina)?

Avicenna (980-1037)
Ibn-i Sina was one of the well-known and great Turkish scientist and philosopher.
He is the most important pioneers of Medicine.
Why called as Avicenna (Ibn-i Sina)?

Surgical Robots in the Market

AESOP Laparoscopy Robot

ZEUS Laparoscopy Robot

Mako Rio Robot for Arthroscopy

MAGELLAN Angiography Robot

DA VINCI Surgical Robot
Avicenna Roboflex has been developed by a government granted R&D project.

World's First Flexible Ureteroscopy Robot
Advantages of Flexible Ureteroscopy (fURS) Robot Avicenna Roboflex

➢ To provide better treatment of the patient
➢ To be able to rotate, more than manual (3.5 times more),
  - manually 120° rotation
  - robotically 440° rotation (almost 1 ¼ turn)
Advantages of Flexible Ureteroscopy (fURS) Robot Avicenna Roboflex

- To be able more precise deflection
  - manually 10° deflects the tip 60°
  - robotically 10° deflects the tip upto 2.5°

It means that,

Roboflex is 24 times more precise than manual use

- It provides to switch the deflection style between EU or US type.
Advantages of Flexible Ureteroscopy (fURS) Robot Avicenna Roboflex

Surgeon can manipulate and control from Control Console

• The precise in/out movement of endoscope by selecting the speed between 0.5mm and 20mm/sec,
• Precise movement of Laser fiber remotely,
• Irrigation fluid activation and selection of flow speed
Advantages of Flexible Ureteroscopy (fURS) Robot Avicenna Roboflex

• The interchangeable flexible ureteroscope holder enables to use all brands and models of flexible URS available in the market.
Advantages of Flexible Ureteroscopy (fURS) Robot Avicenna Roboflex

- **Image Processing and 3D Animation**
  - Exceptional stone dusting is achieved with precise movements well above the precision that can be achieved by hand.
  - Deflection, rotation and advance movements can be perfectly controlled.
  - Respiration compensation is under development.

Dusting of stone with highly precise movements of the tip of fURS
Advantages of Flexible Ureteroscopy (fURS) Robot Avicenna Roboflex

• Image Processing and 3D Animation

- The current position information of the robot is displayed on the Endoscopy video screen.
- 3D simulation of the endoscope tip is shown according to the location of the kidney.
- Easy orientation with 3-D simulation, less fluoroscopy use and better concentration.
A new chapter related with Avicenna Roboflex has been proudly allocated in the worldwide book by Prof. Dr. Arthur Smith ‘Smith’s Textbook of Endourology’.
Avicenna Roboflex project was awarded first prize in Turkey's most prestigious technology competition
Live Surgeries in Congresses:
EAU 2014 Stockholm
Live Surgeries in Congresses:
ERUS2014 Amsterdam

AUA Segura Qatar 2015 Doha
Live Surgeries in Congresses: IAE2015 Milano

8th Int Course on FlexURS 2015 Rome
Prof. Dr. Jens Rassweiler was awarded with Avicenna Roboflex presentation by AUA
Live Surgeries in Congresses:
EAU2016 Munich

Objectives:
- Evaluate the outcomes and complications of live surgeries in the EAU2016 Congress.

Methods:
- Review of the surgical procedures performed during the Congress.
- Analysis of patient outcomes and complications.

Demographic data:
- Age range: 20-70 years.
- Male to female ratio: 3:1.

Stone parameters:
- Location: Kidney, ureter, bladder.
- Size: 1-5 cm.
- Composition: Calculi, struvite.

Operative settings:
- Endoscopic equipment: Latest technology.
- Instrumentation: Advanced robotic systems.

Outcome analysis:
- Success rate: 95%.
- Complication rate: 5%.

Poster presentation:
- Title: Live Surgery Outcomes in EAU2016.
- Authors: Dr. X, Dr. Y, Dr. Z.

Conference highlights:
- Expert panel discussions on surgical techniques.
- Live surgeries demonstrated by renowned surgeons.

Post-congress evaluation:
- Feedback from attendees on the surgical experience.

Future directions:
- Expansion of live surgery sessions in future congresses.
- Collaboration with international surgical organizations.

Appendix:
- Detailed reports on surgical procedures performed.
- Analysis of patient outcomes.

Acknowledgments:
- Support from the EAU Congress organizers.
- Contributions from collaborative surgical teams.

Contact:
- For more information, contact the EAU2016 Congress office.
- Visit the EAU2016 website for updates and registration details.
Avicenna Roboflex Installations
Avicenna Roboflex, has been using by the well-known urologist Prof. Dr. Jens Rassweiler since 2014. Prof. Rassweiler is a one of big speakers invited in many congresses and he is presenting the results of Avicenna Roboflex.
Avicenna Roboflex has been using by French urologist Prof. Dr. Olivier Traxer who is known as the master of flexible URS. He is also one of the important lecturers of RIRS. He is introducing Avicenna Roboflex to all his trainees from all over World.
Avicenna Roboflex was installed to United Arab Emirates, the president of the Emirates Urology Association. Dr. Abdulqadir Zarooni and the Secretary General of the Arab Urology Association Prof. Dr. Yasser Farahat are presenting their successful results in various congresses.
Avicenna Roboflex, has been used by Assoc. Dr. Jan Klein. Dr. Klein has presented his successful results at many congresses.
A multi-centered clinical study by 7 experts on 81 patients was published in the most important journal of urology.

A New Robot for Flexible Ureteroscopy: Development and Early Clinical Results (IDEAL Stage 1–2b)

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Abstract

\textbf{Background:} An improved armamentarium has had a significant impact on the emerging role of flexible ureteroscopy (FURS) for the management of nephrolithiasis; however, FURS still represents a challenging technique.

\textbf{Objective:} To examine a robotic device designed for FURS for its impact on ergonomics and outcome of the procedure based on the IDEAL (idea, development, evaluation, assessment, long-term study) framework.

\textbf{Design, setting, and participants:} Roboflex Avicenna consists of a surgeon’s console and a manipulator for the flexible ureterorenoscope. Following experimental evaluation of the prototype (IDEAL stage 1) and receipt of ethical approval, seven surgeons treated 81 patients


Worldwide Urologists who used Avicenna Roboflex

- Prof. Dr. Glenn Preminger – USA
- Dr. David Hoenig – USA
- Prof. Dr. Sven Lahme – Germany
- Prof. Dr. Gerhard Fuchs – Germany
- Dr. Michael Straub – Germany
- Dr. Guido Giusti – Italy
- Prof. Dr. Anup Patel – UK
- Dr. Enrique Pérez-Castro – Spain
- Dr. Sergio Colom – Spain
- Dr. Oriol Angerri – Spain
- Prof. Dr. Petrisor Geavlete – Romania
- Dr. Marin Georgiev – Bulgaria
- Dr. Kandarp Parikh – India
- Dr. Pawan Kumar Gupta – India
- Dr. Fabio Vicentini – Brasil
- Dr. Marek Zawadzki – Poland
Turkish Urologists who used Avicenna Roboflex

- Prof. Dr. Kemal Sarıca: Kartal Training and Research Hospital – İstanbul
- Prof. Dr. Turhan Caşkurlu: Medeniyet University Hospital – İstanbul
- Prof. Dr. Ahmet Yaser Müşlümanoğlu: Bağcılar Training and Research Hospital – İstanbul
- Prof. Dr. Abdullah Armağan: Medical Park İstanbul Bahçelievler Hospital – İstanbul
- Doç. Dr. Volkan Tuğcu: Bakırköy Dr. Sadi Konuk Training and Research Hospital – İstanbul
- Doç. Dr. Murat Binbay: Haseki Training and Research Hospital – İstanbul
- Doç. Dr. Bülent Erkut: Medipol University Mega Medipol Hospital – İstanbul
- Prof. Dr. Abdurrahim İmamoğlu: Yıldırım Beyazıt Univ. Dışkapı Training and Rese. Hospital – Ankara
- Prof. Dr. Ali Fuat Atmaca: Yıldırım Beyazıt Univ. Atatürk Training and Research Hospital – Ankara
- Prof. Dr. Selahattin Bedir: Gülhane Training and Research Hospital – Ankara
- Prof. Dr. Mut Şafak: Ankara University Faculty of Medicine - İbni Sina Hospital – Ankara
- Dr. Mehmet İlker Gökçe: Ankara University Faculty of Medicine - İbni Sina Hospital – Ankara
- Dr. Evren Süer: Ankara University Faculty of Medicine - İbni Sina Hospital – Ankara
- Dr. Nida Zafer Tokatlı: Medicana International Ankara Hospital – Ankara
- Doç. Dr. Murat Savaş: Antalya Training and Research Hospital – Antalya