# Robotsebészet a gyermekkorban: álom, vagy valóság?

Hahn Oszkár

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SEMMELWEIS EGYETEM 1769

# Semmelweis - HPB team

Hepato-pancreatico-biliary (HPB) team: surgical, gastroenterological and transplant members of STéG (~20 persons)

## Clinical work

- *High volumen center, yearly:*
  - *1300 patient at Liver-MDT meetings*
- ***~ 530 HPB surgeries:***
  - **220 liver resections/year**
  - 180 pancreas resection / year
  - **65 complex biliary opertaion/ year**
  - **70 OLTx**

## Reseach

- Basic resecarch: claudin, vesiculas…etc
- Experimental: liver regeneration… etc.
- Clinical research
- HPB Surgical Research Center (est. in 2015)

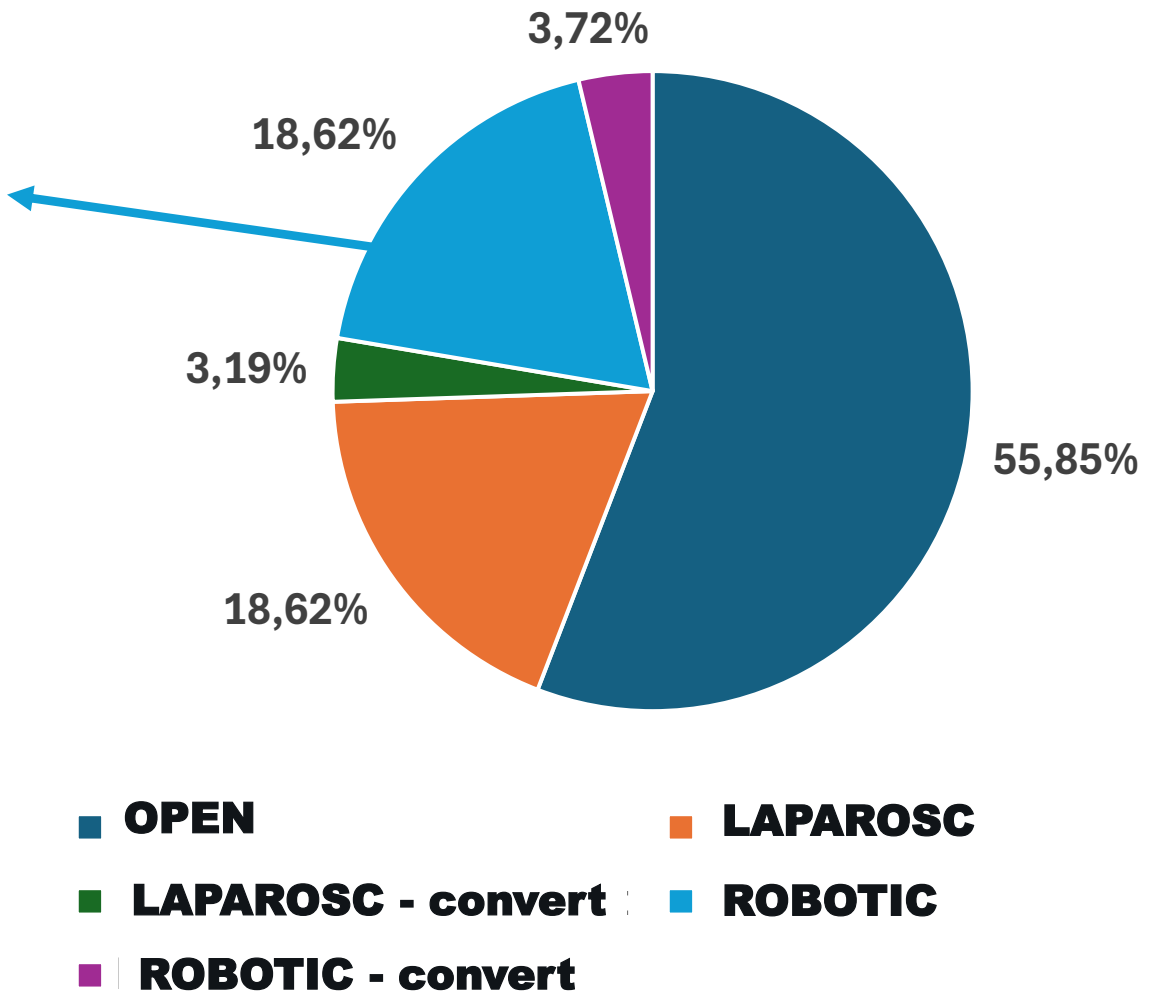
## Education

- Regular national / international meetings
- UEMS – Tx

# Almost 50% minimally invasive

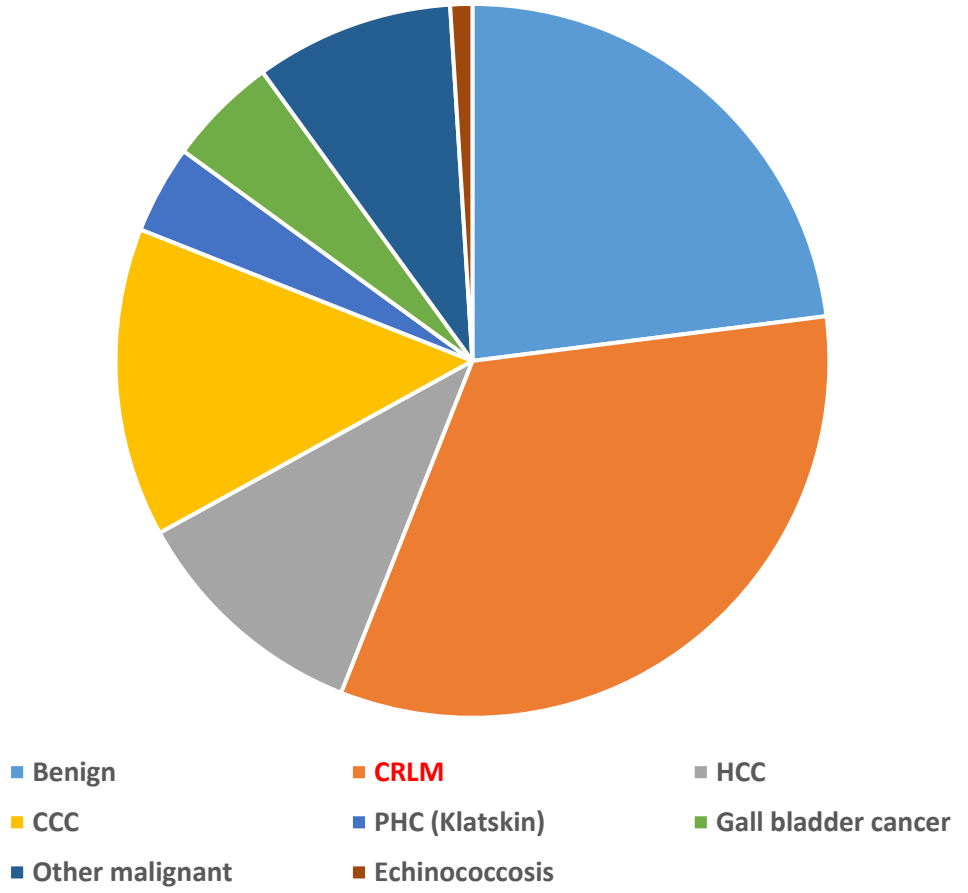
## ***ROBOTIC hepatectomies:***

- ***Da-Vinci Xi system since 2022***
- ***180 cases*** in **40** months
- **Age**: 59,4 (±13.2) years
- **Gender**: 85 male / 95 female
- > Clavien-Dindo 3 ***morbiditiy: 11%***
- ***Mortality: (1pt) <1%:*** ulcerative colitis exacerbation, septic shock, liver failure
- ***Conversion*** to open: ***6,4%***



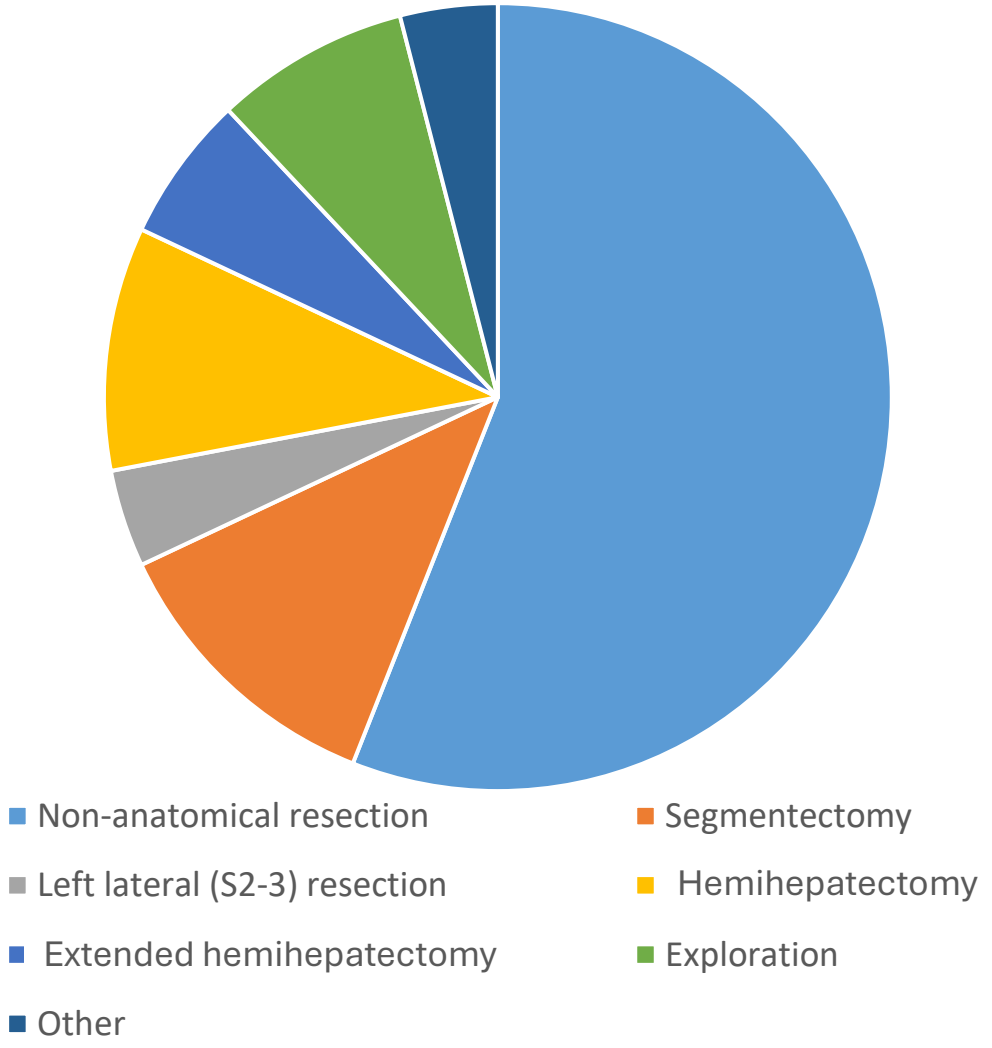
# First 180 robotic liver surgeries - indications

| | |
|---|---|
| Benign | 28 |
| CRLM | 69 |
| HCC | 28 |
| iCC | 38 |
| | |
| PHC (Klatskin) | 6 |
| Gall bladder cancer | 11 |
| Other malignant | 9 |
| Alveolar echinococcosis | 1 |



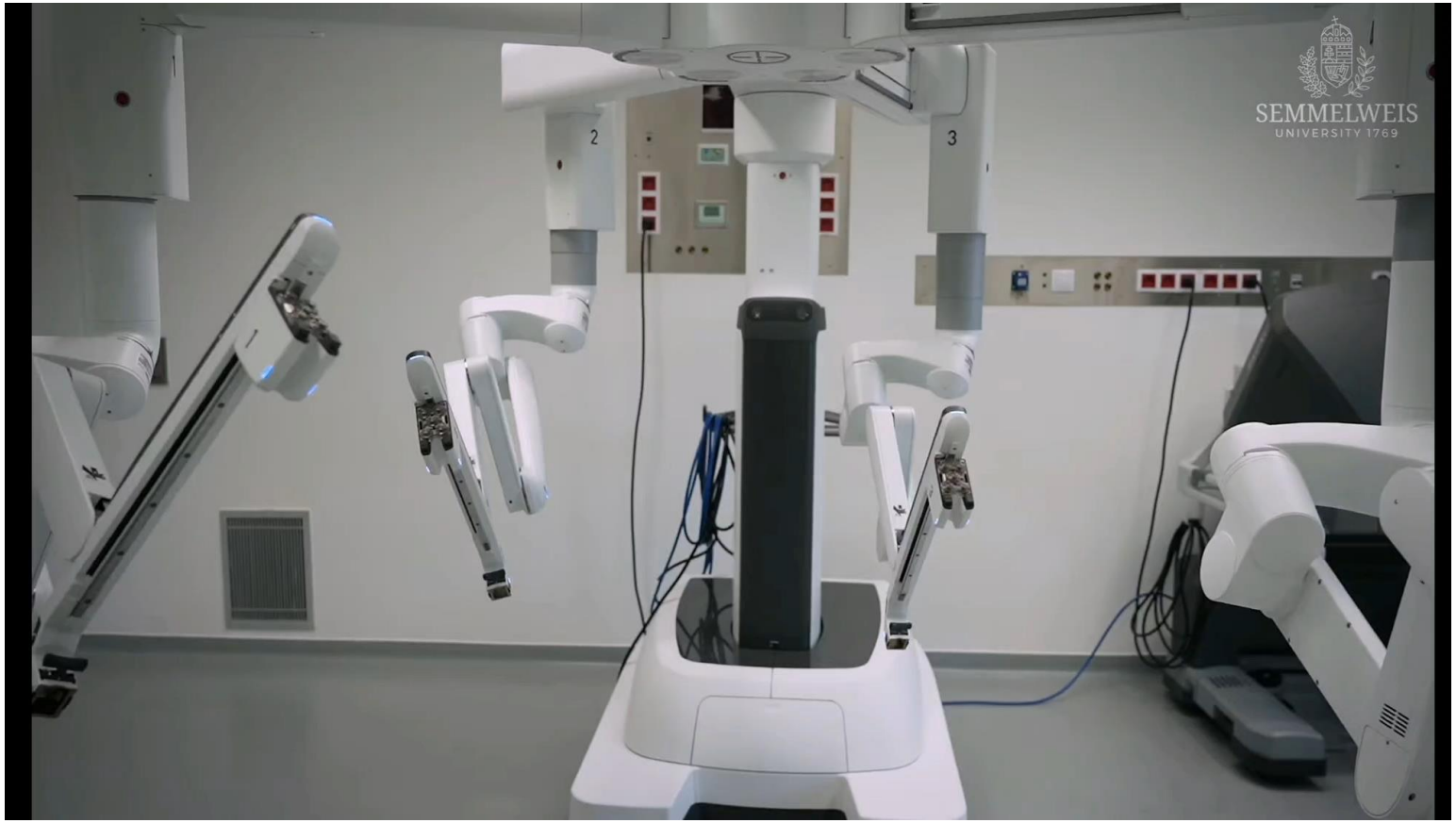
# First 180 robotic liver surgeries - procedures

| | |
|---|---|
| Non-anatomical resection | **92** |
| Segmentectomy<br>(3 anterior and 4 posterior sectionectomies included) | **36** |
| Left lateral resection | **11** |
| Hemihepatectomy | **20** |
| Extended hemihepatectomy | **9** |
| Exploration | **8** |
| Other (ALPPS) | **4** |



# DaVinci Xi

- 10x magnification
- 3D
- **7 dergees of freedom** (7 DoF):
  - The arms can move:
    - in 7 various direction and
    - around 7 axis
  - better than a human hand

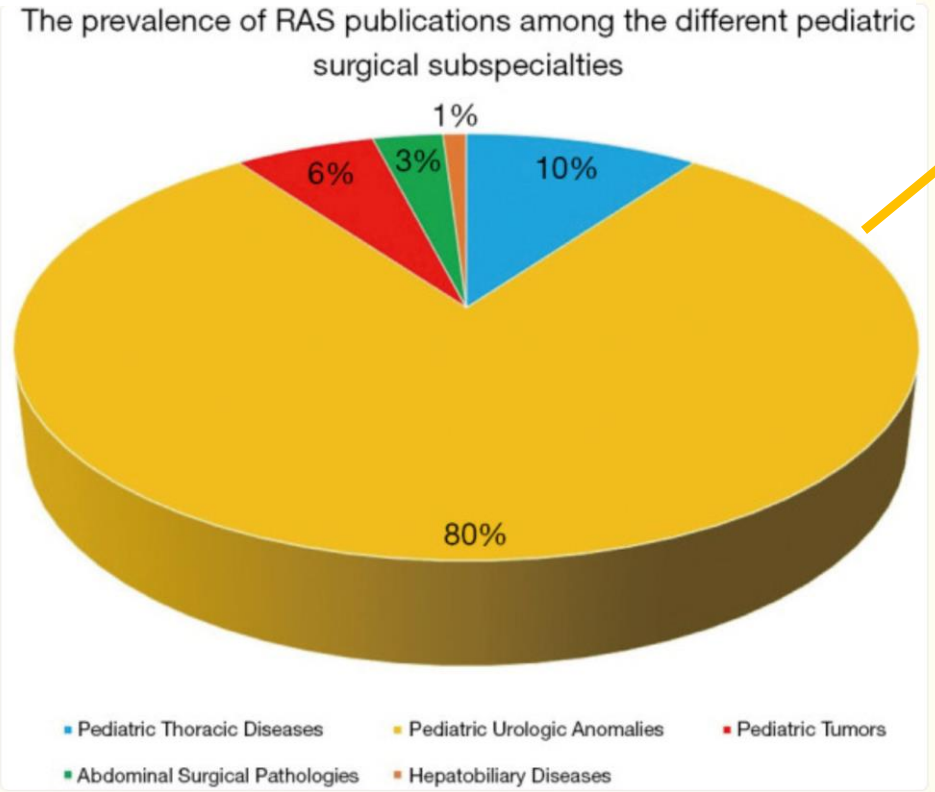


# ROBOTIC SURGERY - PEDIATRIC USE

Transl Pediatr. 2023 Jan 15;12(2):271–279. doi: 10.21037/tp-22-338

**Robotic-assisted surgery in pediatrics: what is evidence-based?—a literature review**

Alessandro Boscarelli [1,^,✉], Emanuela Giglione [2,#], Maria Rita Caputo [2,#], Edoardo Guida [1,^], Marianna Iaquinto [1], Maria-Grazia Scarpa [1], Damiana Olenik [1], Daniela Codrich [1,^], Jürgen Schleef [1,^]




## MAINLY UROLOGICAL SURGERIES (Pubmed)

- pyeloplasty for ureteropelvic junction obstruction
- ureteral reimplantation (Lich-Gregoire technique

Advantages:

- lower conversion rates
- less blood loss
- less anast. Insuff.
- narrow space

- All ***other indications*** in pediatric surgery are ***still under discussion***
- Robotics is certainly a ***promising technology*** to ***operate in areas that might otherwise present as a challenge*** during traditional open or minimally invasive surgeries.

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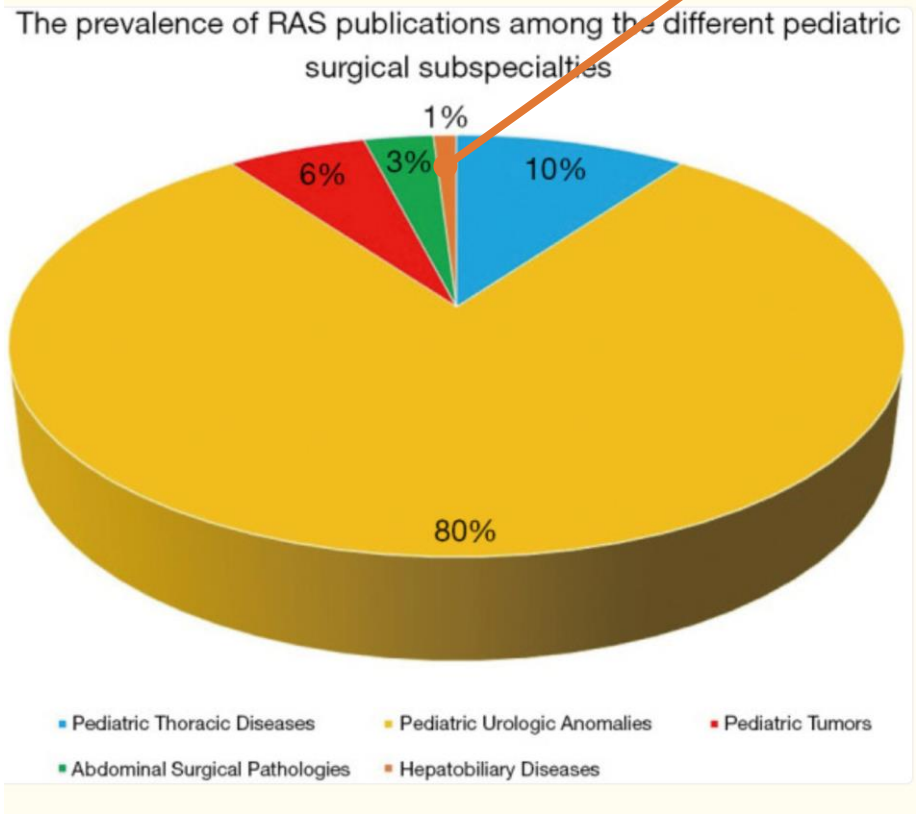



**Only *1%* of published robotic cases are *HPB cases***

- mainly cholecystectomies or bile duct surgeries

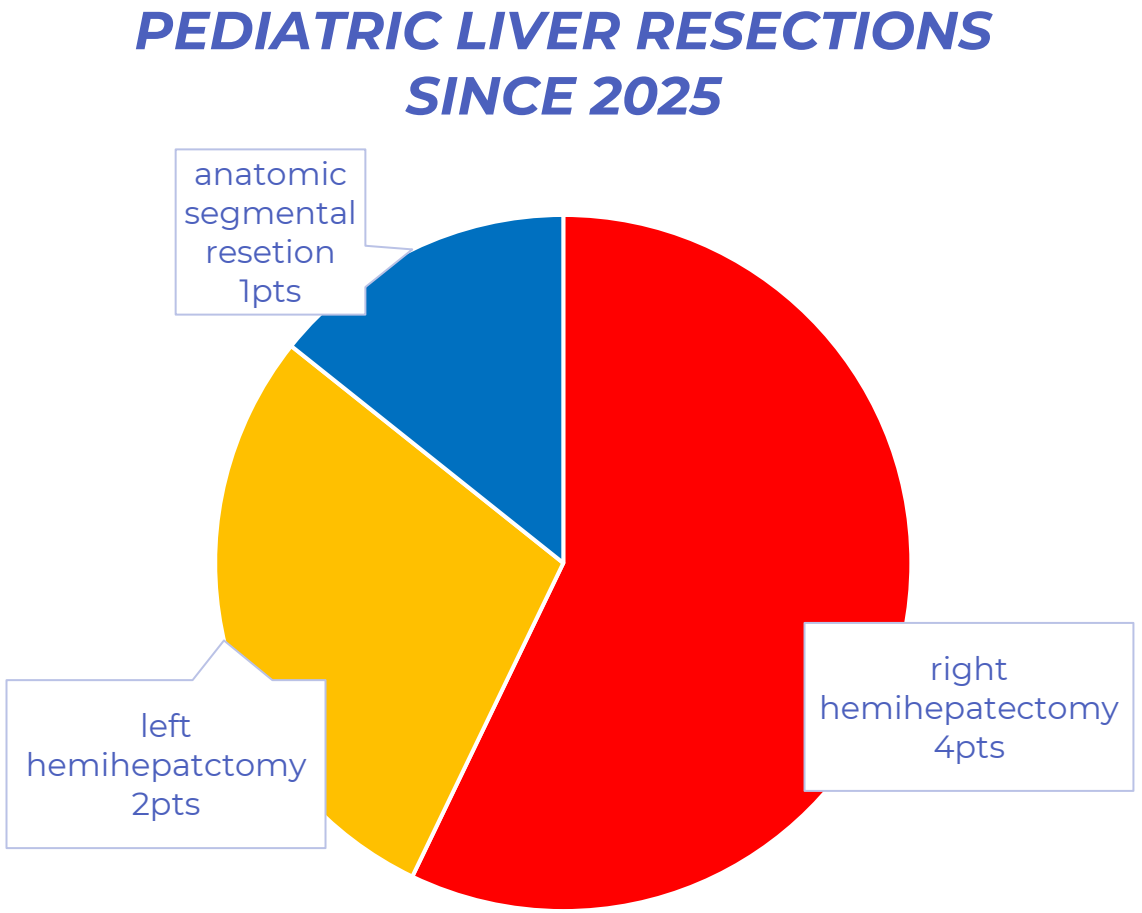
***LIVER RESECTIONS (Pubmed)***

- only 5!!! publications are dealing with liver resections, mostly:
  - benign and
  - minor resections and
  - case reports

| First author an | Cases | Age | Weight | Genc | Tumor his | Preop ch | Type of hepa | Operativ | Blood loss | Age | Transsection | No.of arms | Blood loss | Pringle | ICU sta | Hospital | Radicality | Clavien-Dind | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chen, 2019 | 1 | 3 years | Not repor | Male | Fetal hepa | N/A | S5 segmentectom | 6 min | 20 ml | 3 years | "The tumour ar | 4 | 200 ml | "The hepatic | Nem? "( | 12 days | R0 | ha intraop kapt | vvt, plazma | "there was a blo |
| Sandlas, 2021 | 1 | 3 years | NR | Fema | Fetal hepat | Cisplatin-d | Right hepatecti | 320 min | 200 ml | 3 years | "Once the dem | 3 | 200 ml | - | Volt, de | 20 days | NR | Grade 3a | ptx miatt csö, ep | "Regrettably, by |
| Park, 2024 | 2 | 8 years | 28.9 kg | Fema | FNH | - | Partial hepatec | 210 min | "Minimal, less t | 8 years | "Liver resectior | 3 | "Minimal, less | - | 1 day | 6 days | R0 | Grade 0 | itt nem volt sem | "There was no c "no complication |
| | | 8 years | 30 kg | Male | FNH | - | Partial hepatec | 193 min | "Minimal, less t | 8 years | "Liver resectior | 3 | "Minimal, less | - | 1 day | 6 days | R0 | Grade 1 | katéter kellett | "There was no c "had to get foley |
| Wu, 2025 | 12 | Media | Median: 3 | 4 mal | FNH | - | Ennyi van: "Lo | Median: 1 | Median: 23.3 m | Median: 7.7 ye | "Parenchymal t | 3 | Median: 23.3 | "Intermittent | NR | Median: 5. | NR | Grade 0? | szerintem a tábl | "The remaining p |
| Vecchione, 2024 | 12 | Media | Median: 1 | 7 mal | Mesenchym | - | Complete cyst | Median: 2 | "no significant i | Median: 3.1 ye | "Robotic instru | 3 | "no significan | Gondolom n | NR | Median: 4 | Ennyi van: " | Grade 2 (1 pati | sebfertőzés miat | "Post-operative |
| | | 3 years | 15 kg | Male | Simple hepat | - | Ennyi van: Couir | NR | NR | 3 years | NR | 3 | NR | NR | NR | 3 days | No reccurenc | NR | | |
| | | 9 years | 28.7 kg | Fema | Mesenchyma | - | Couinaud hepati | NR | NR | 9 years | NR | 3 | NR | NR | NR | 6 days | No reccurenc | NR | | |
| | | 3 years | 19.3 kg | Fema | Mesenchyma | - | Couinaud hepati | NR | NR | 3 years | NR | 3 | NR | NR | NR | 2 days | No reccurenc | NR | | |
| | | 0.8 yea | 8.1 kg | Male | Ciliated hepa | - | Couinaud hepati | NR | NR | 0.8 years | NR | 3 | NR | NR | NR | 4 days | No reccurenc | NR | | |
| | | 1 years | 12 kg | Fema | Simple hepat | - | Couinaud hepati | NR | NR | 1 years | NR | 3 | NR | NR | NR | 4 days | No reccurenc | NR | | |
| | | 10 year | 27.5 kg | Male | Mesenchyma | - | Couinaud hepati | NR | NR | 10 years | NR | 3 | NR | NR | NR | 6 days | Recurrence | NR | | |
| | | 0.5 yea | 5.1 kg | Fema | Congenital ci | - | Couinaud hepati | NR | NR | 0.5 years | NR | 3 | NR | NR | NR | 7 days | No reccurenc | NR | | |
| | | 9 years | 27.5 kg | Male | Simple hepat | - | Couinaud hepati | NR | NR | 9 years | NR | 3 | NR | NR | NR | 4 days | No reccurenc | NR | | |
| | | 2 years | 10.2 kg | Fema | Simple hepat | - | Couinaud hepati | NR | NR | 2 years | NR | 3 | NR | NR | NR | 4 days | No reccurenc | NR | | |
| | | 11 year | 33.8 kg | Male | Ciliated hepa | - | Couinaud hepati | NR | NR | 11 years | NR | 3 | NR | NR | NR | 3 days | No reccurenc | NR | | |
| | | 1 years | 12.7 kg | Male | Elements of | - | Couinaud hepati | NR | NR | 1 years | NR | 3 | NR | NR | NR | 5 days | No reccurenc | NR | | |
| | | 9 years | 30.2 kg | Male | Mesenchyma | - | Couinaud hepati | NR | NR | 9 years | NR | 3 | NR | NR | NR | 4 days | No reccurenc | NR | | |
| | | | | | | | | | | | | | | | | | | | | |
| Pekli, 2026 | 6 | Media | Median: 3 | 3 mal | 3 hepatocel | | | Median: 2 | Median: 75 ml | Median: 11.5 y | | 4 | Median: 75 m | | Median: | Median: 5. | R0 | | | |
| | | 14 yea | 43.8 kg | Fema | Hepatocellu | Cisplatin-d | Right hepatecti | 370 min | 1000 ml | 14 years | double bipolar | 4 | 1000 ml | - | 3 days | 8 days | R0 | Grade 2 | vvt kapott | |
| | | 11 yea | 33.4 kg | Male | Hepatocellu | Cisplatin-d | Right hepatecti | 280 min | Minimal | 11 years | double bipolar | 4 | Minimal | - | 4 days | 5 days | R0 | Grade 0 | | |
| | | 12 yea | 30 kg | Male | FNH | - | Left lateral rese | 165 min | 50 ml | 12 years | double bipolar | 4 | 50 ml | 10 min | 2 days | 6 days | R0 | Grade 0 | | |
| | | 7 years | 26 kg | Fema | Embryonal s | I2VA (ifosf | Right hepatecti | 390 min | 200 ml | 7 years | double bipolar | 4 | 200 ml | 3 min | 4 days | 5 days | R0 | Grade 0 | | |
| | | 15 yea | 47 kg | Fema | FNH | - | Non-anatomica | 215 min | 100 ml | 15 years | double bipolar | 4 | 100 ml | - | 2 days | 6 days | R0 | Grade 0 | | |
| | | 4 years | 15 kg | Male | Hepatocellu | - | Anatomical res | 165 min | Minimal | 4 years | double bipolar | 4 | Minimal | - | 1 day | 5 days | R0 | Grade 0 | | |

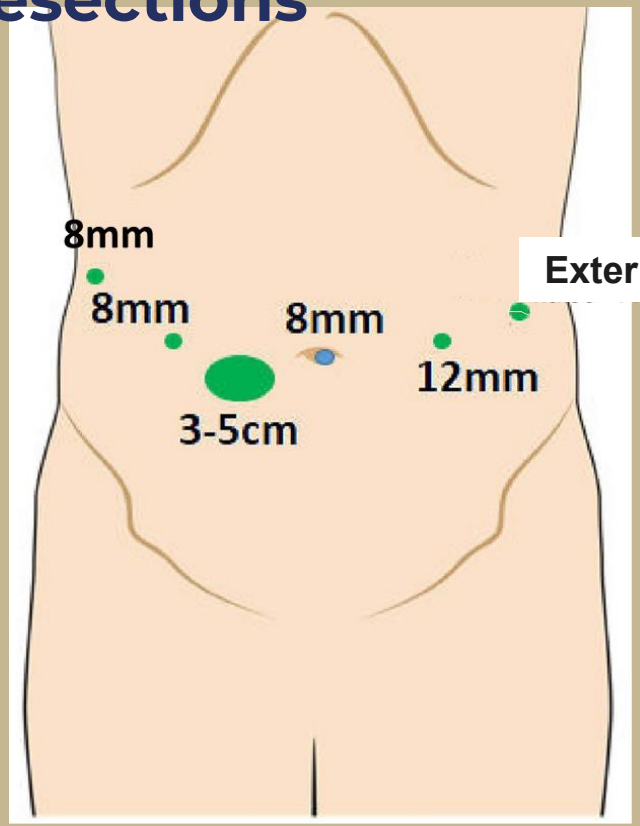
# Pediatric Robotic Liver Surgery Program at Semmelweis

| | |
|---|---|
| Hepatoblastoma | 1 |
| Embryonal sarcoma | 1 |
| Hepatocellular malignant neoplasm, NOS (HEMNOS) | 3 |
| FNH | 2 |



# Port placement

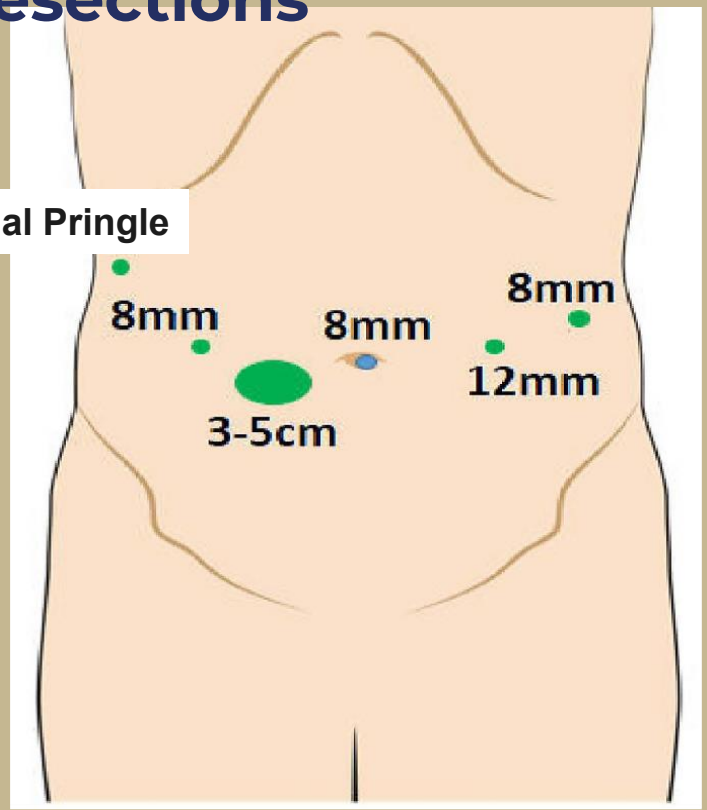
## Right sided resections




External Pringle

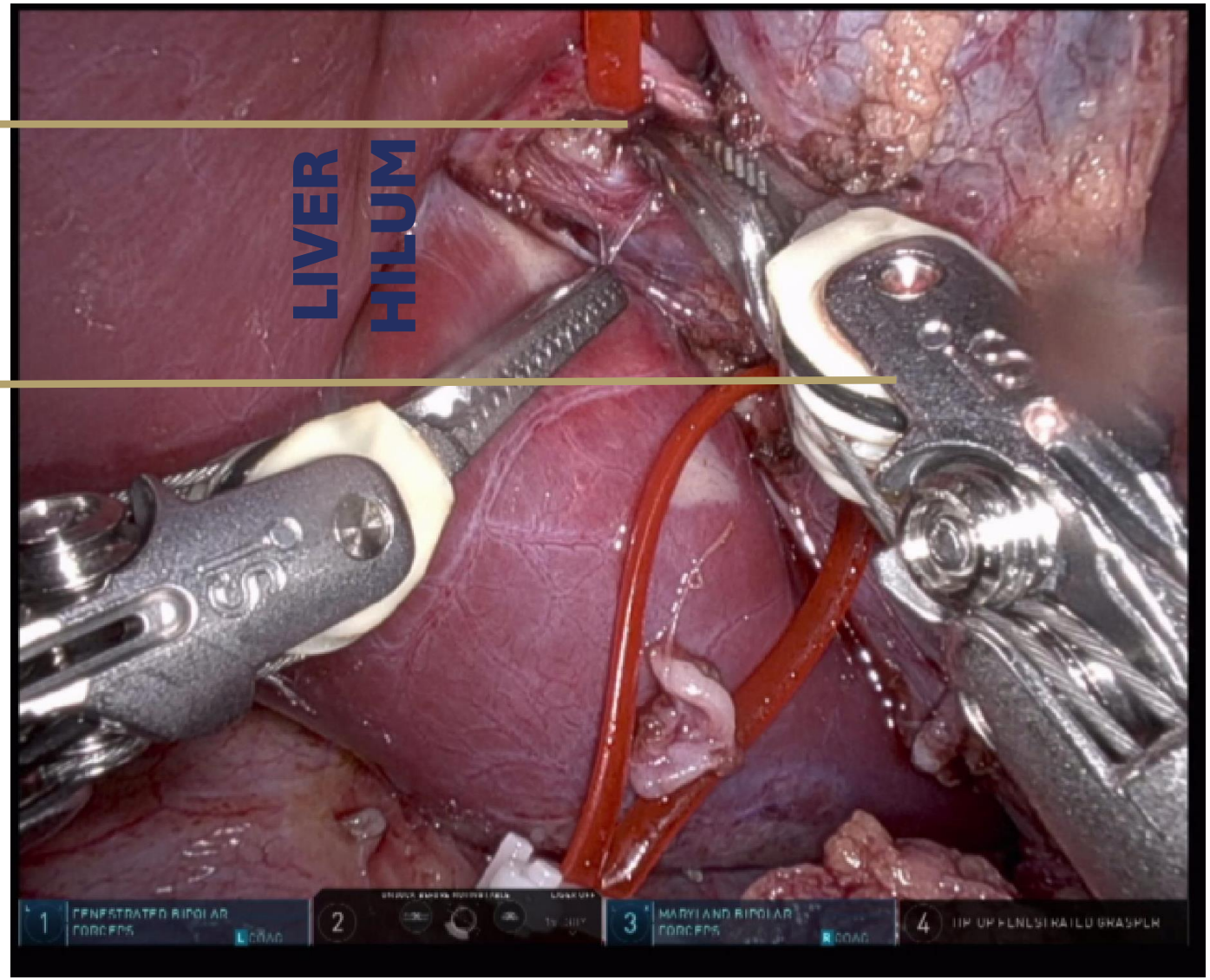
## Left sided resections

External Pringle




Oszkar Hahn

# Pediatric Robotic Liver Surgery Program at Semmelweis

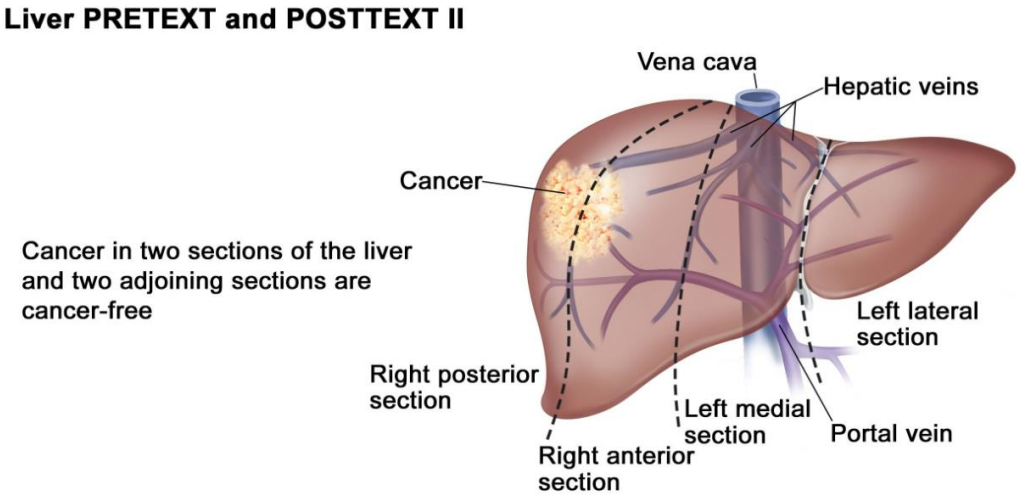



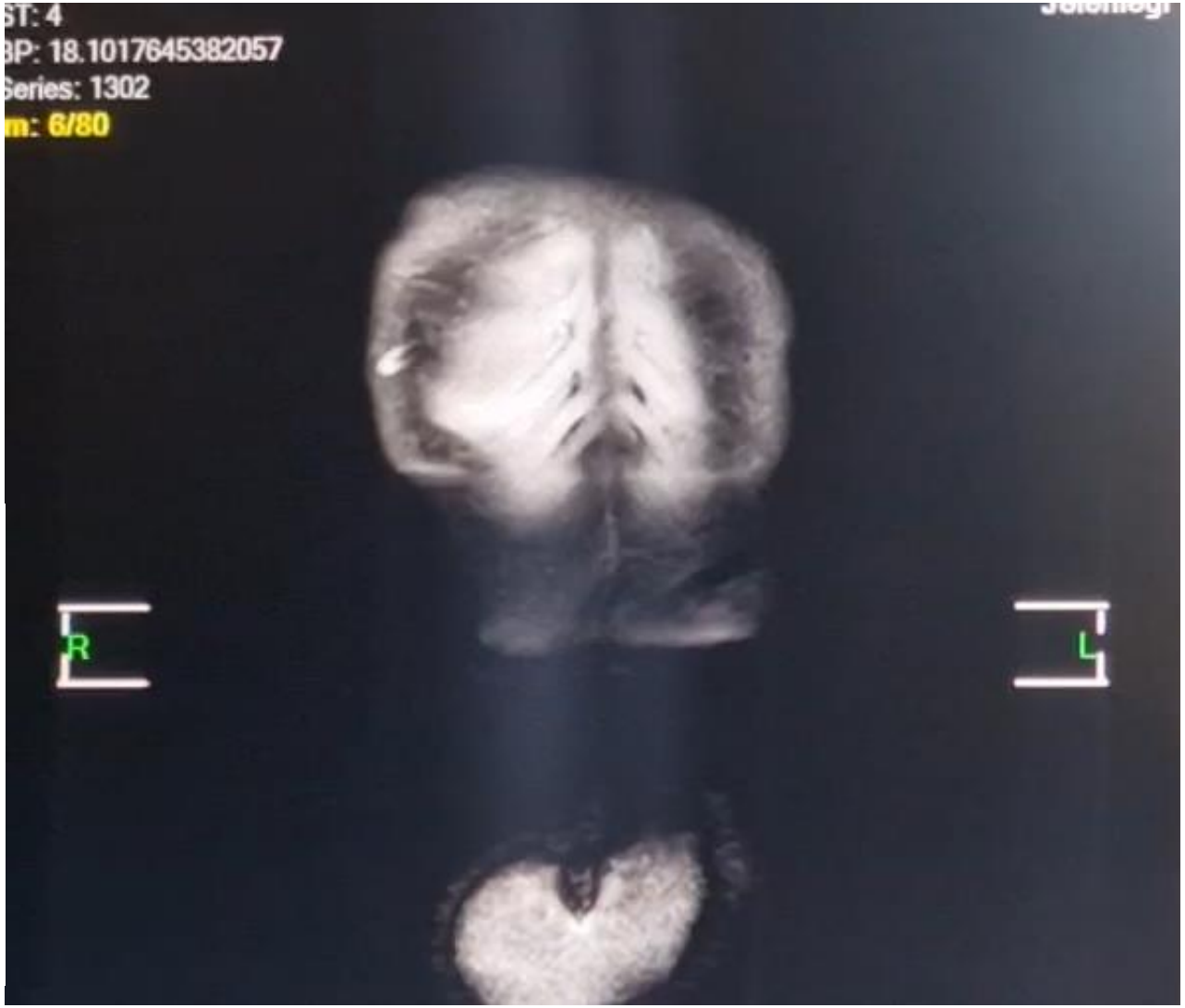

- Small structures
  (10x magnification)
- Ideal for the robotics

# Pediatric Robotic Liver Surgery Program at Semmelweis

- K.L
- 6ys
- HEMNOS
- PRETEXT II

***Right hepatectomy planned***



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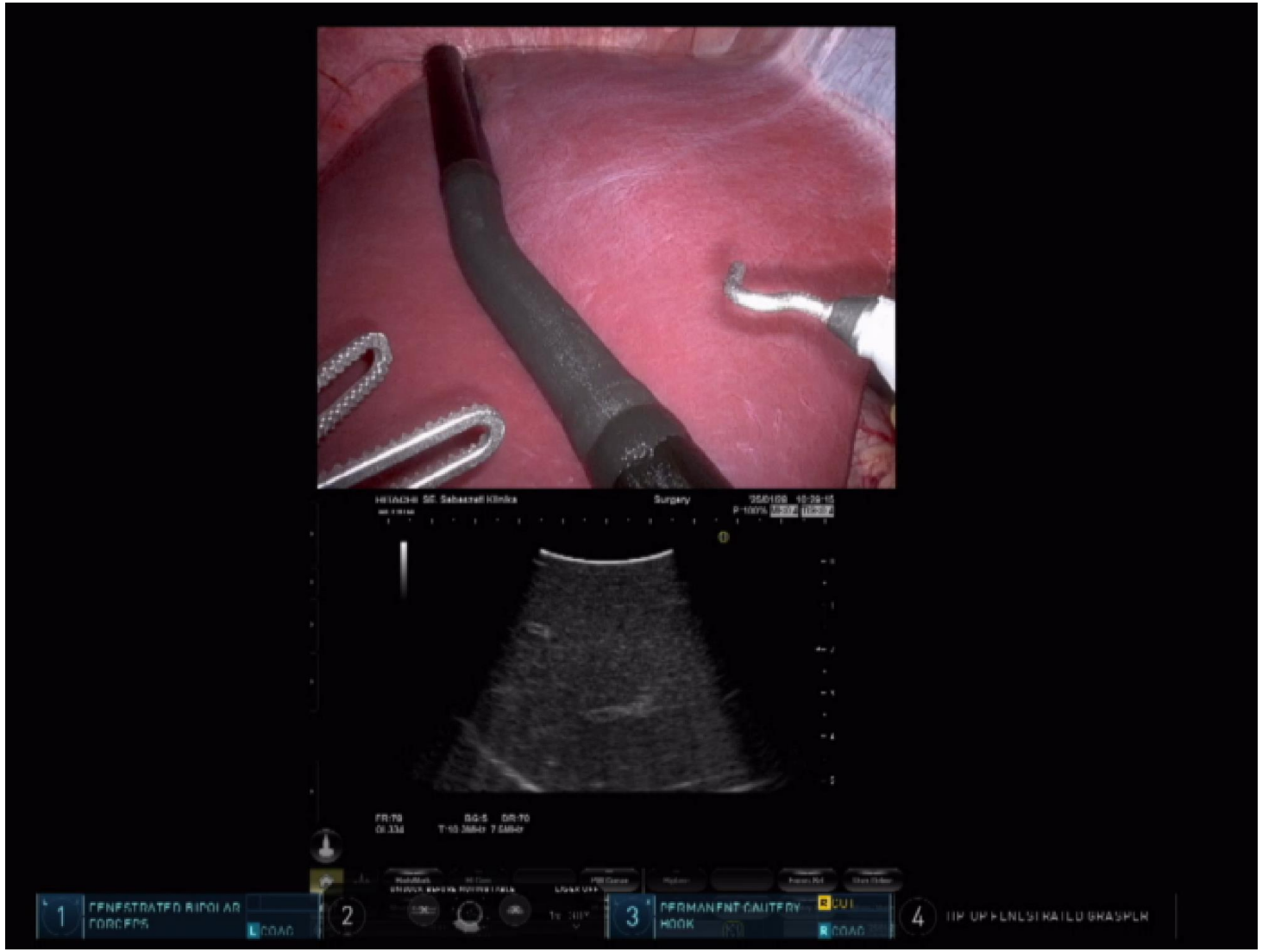
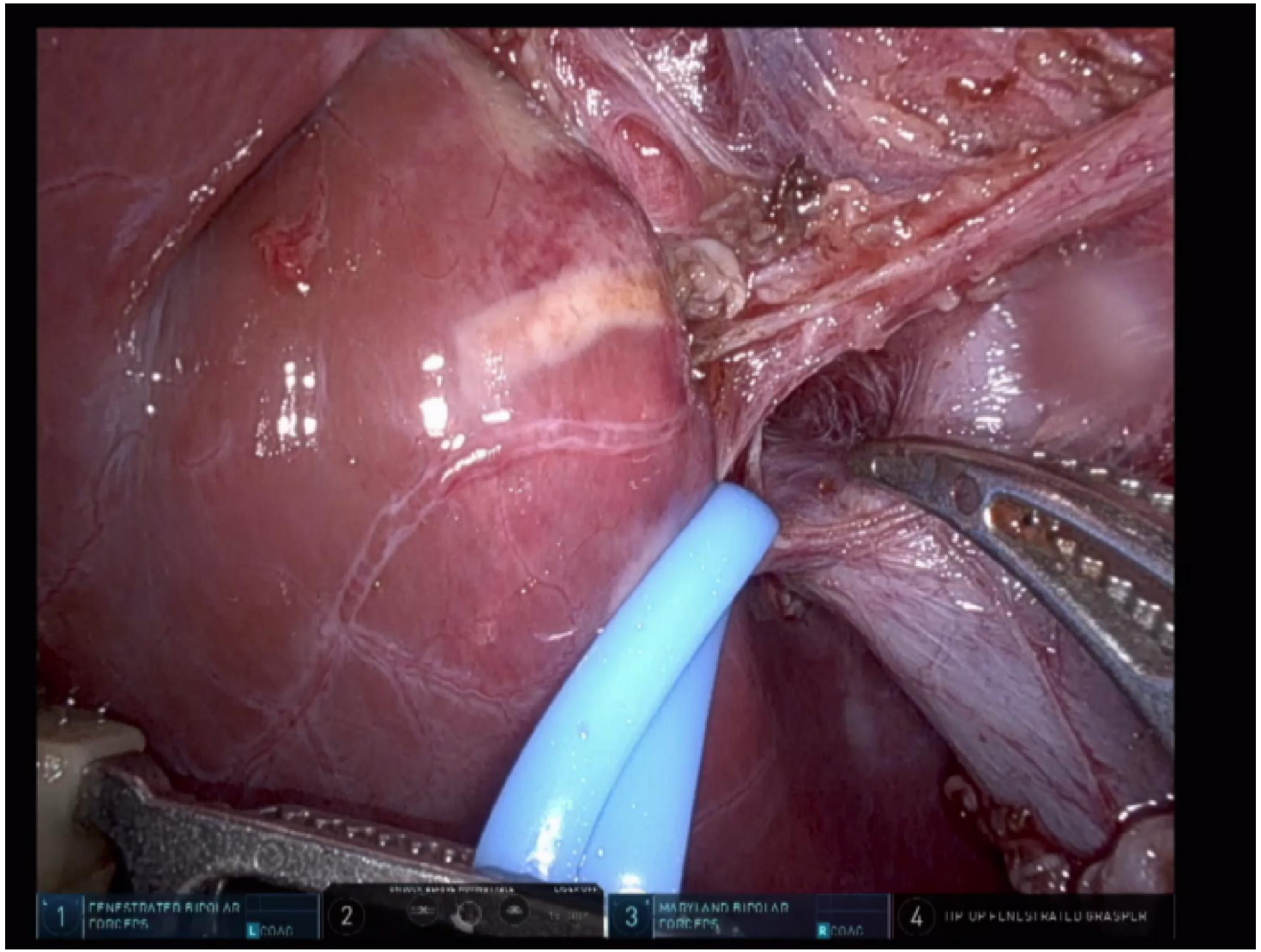
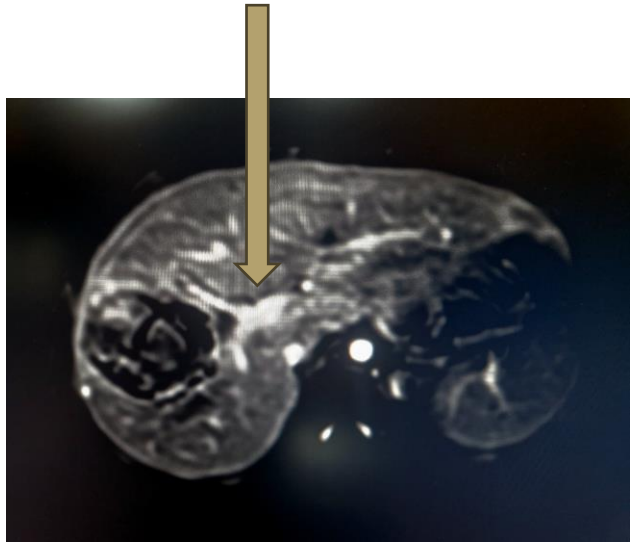


- right hepatic artery

# Pediatric Robotic Liver Surgery Program at Semmelweis



- Portal vein trifurcation



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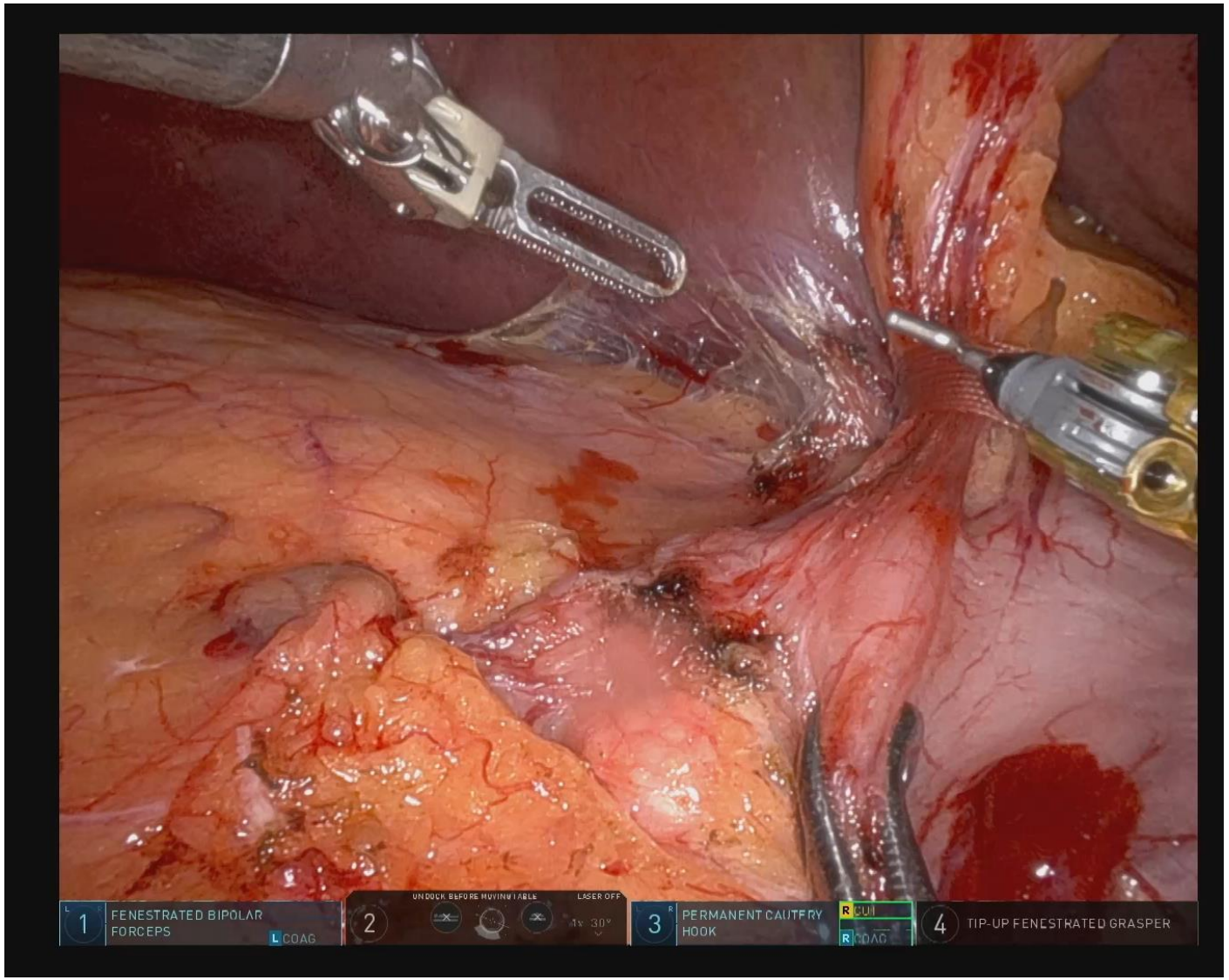
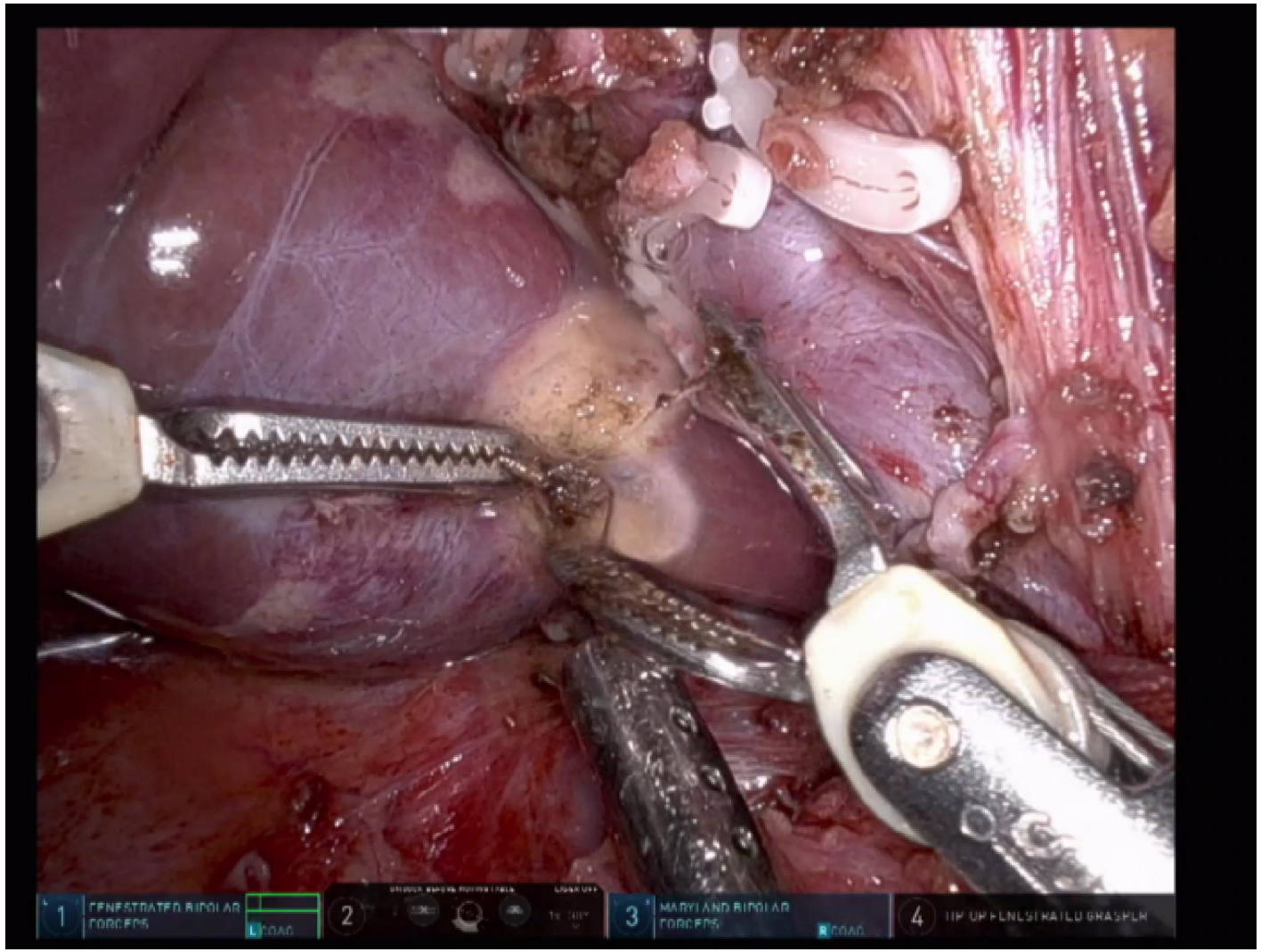



*ICG use:*

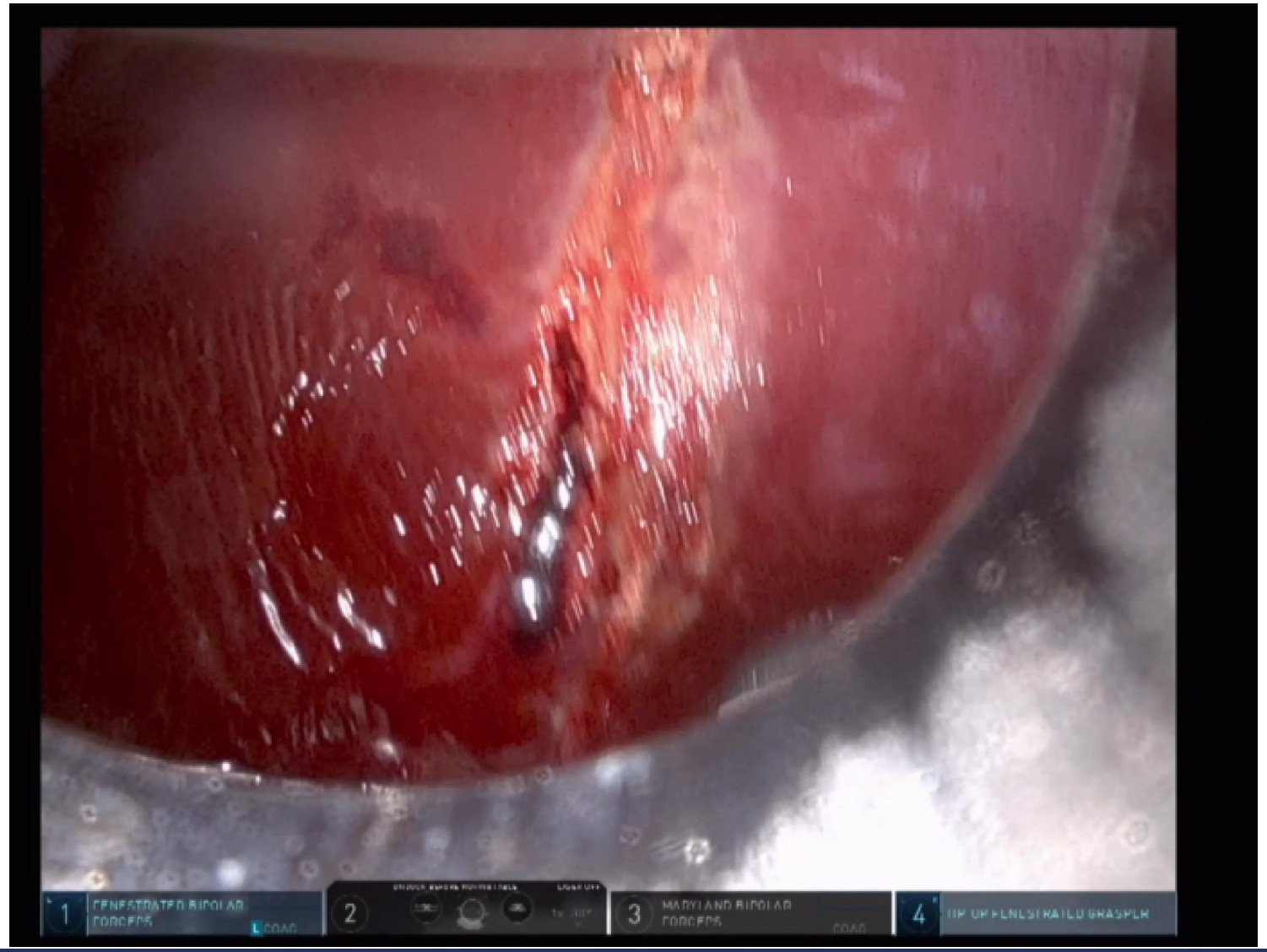
Demarcation of right and left lobe (transsection line)

# Pediatric Robotic Liver Surgery Program at Semmelweis



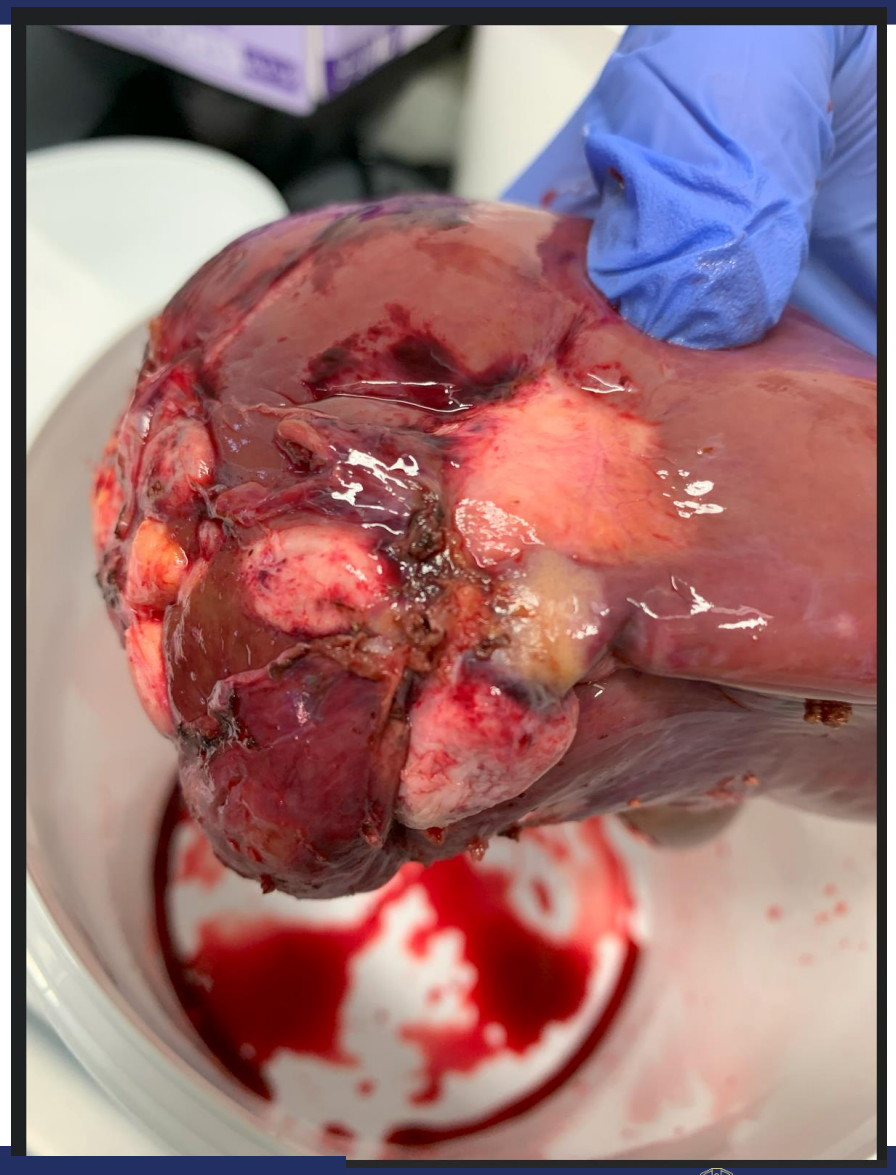
- Posterior (caudate) approach

# Pediatric Robotic Liver Surgery Program at Semmelweis



- Liver transsection
- V5 vein
- Bile duct (right hepatic duct)
- V8 vein
- Right hepatic vein

# Pediatric Robotic Liver Surgery Program at Semmelweis



- right lobe specimen

# Pediatric Robotic Liver Surgery Program at Semmelweis
## *POSTOPERATIVE COURSE*

**COMPLICATIONS:**

- *Morbidity:*

1/7pts: C-D II.:

(2x5cm hematoma: no intervention needed)

- Mortality : 0/7

# Pediatric Robotic Liver Surgery Program at Semmelweis
*POSTOPERATIVE COURSE*

## ICU and HOSPITAL STAY:

- *ICU: 2 days (1-4 days)*
- *Hospital: 4 days (3-7 days)*

# Pediatric Robotic Liver Surgery Program at Semmelweis
## *POSTOPERATIVE COURSE*

**SURGICAL RADICALITY:**

- *R0 resection: 7/7*

***All patients are tumor free***

*(median follow up: 7 months)*

# Pediatric Robotic Liver Surgery Program at Semmelweis

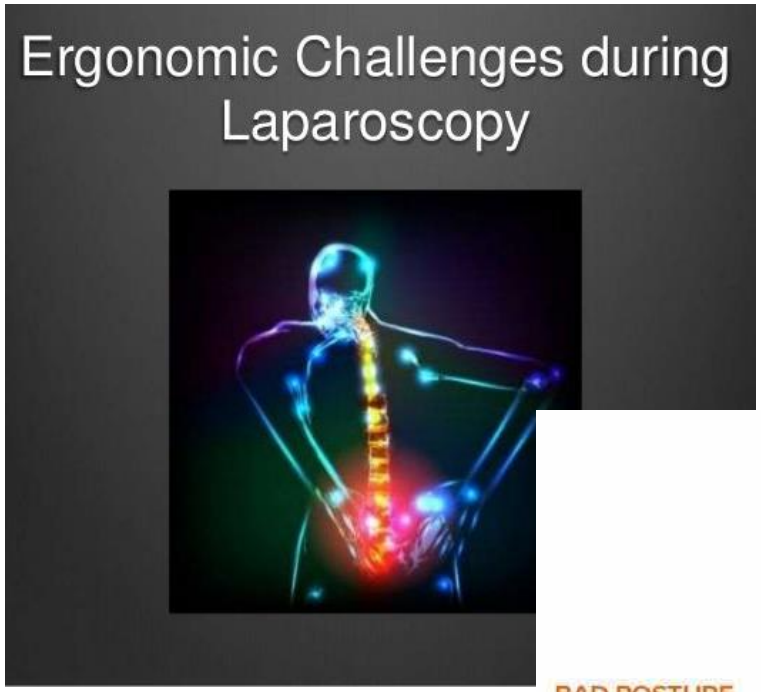
First admission | After chemo | 3mo after resection


- K.L
- 6ys
- hepatoblastoma

# Indications for robotic liver surgery at Semmelweis after 180 cases

- "difficult" segments/sectors (s1, s6, s7, s8-dorsal, s4a)
- difficult major resections
- hilar lymphadenectomy needed
- expected to require suturing
- KLATSKIN (Never laparoscopically!!)
- ***Pediatric liver resection***
- EXTRAS (diaphragm +/- pericardial infiltration...etc)

# ERGONOMY – does it matter?






# Feasible and safe, with excellent oncological outcomes

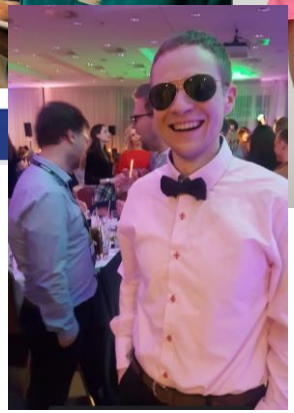
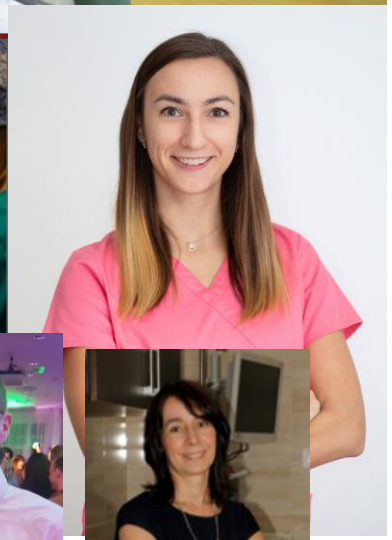
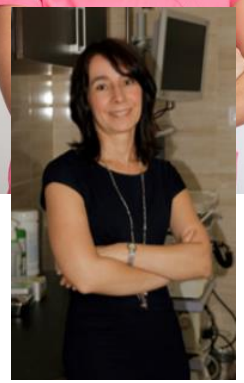
# KÖSZÖNÖM









Liver-team

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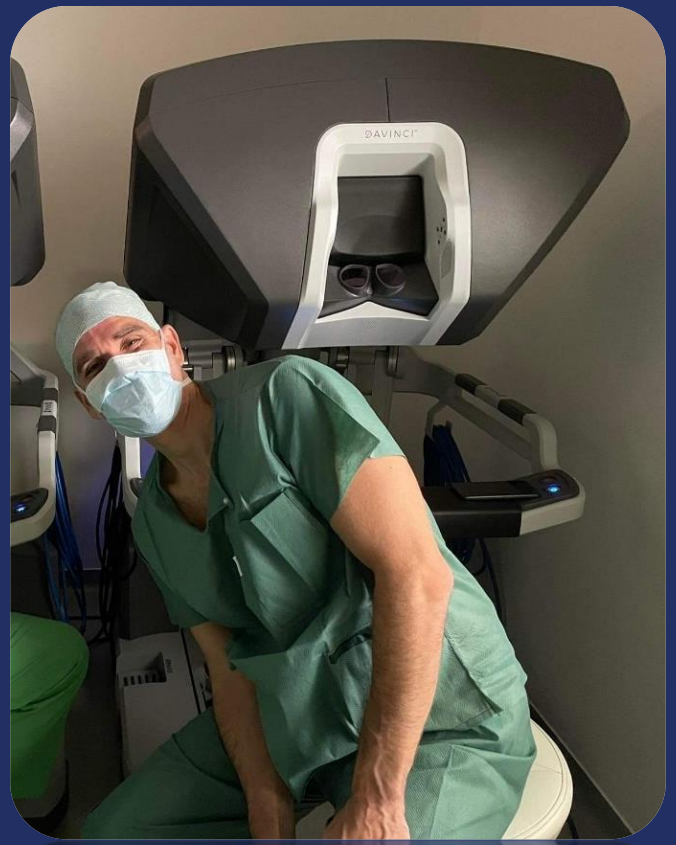


# VISIT US!

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