

Viability of Pelvic Exenteration for Locally Advanced Rectal Cancer

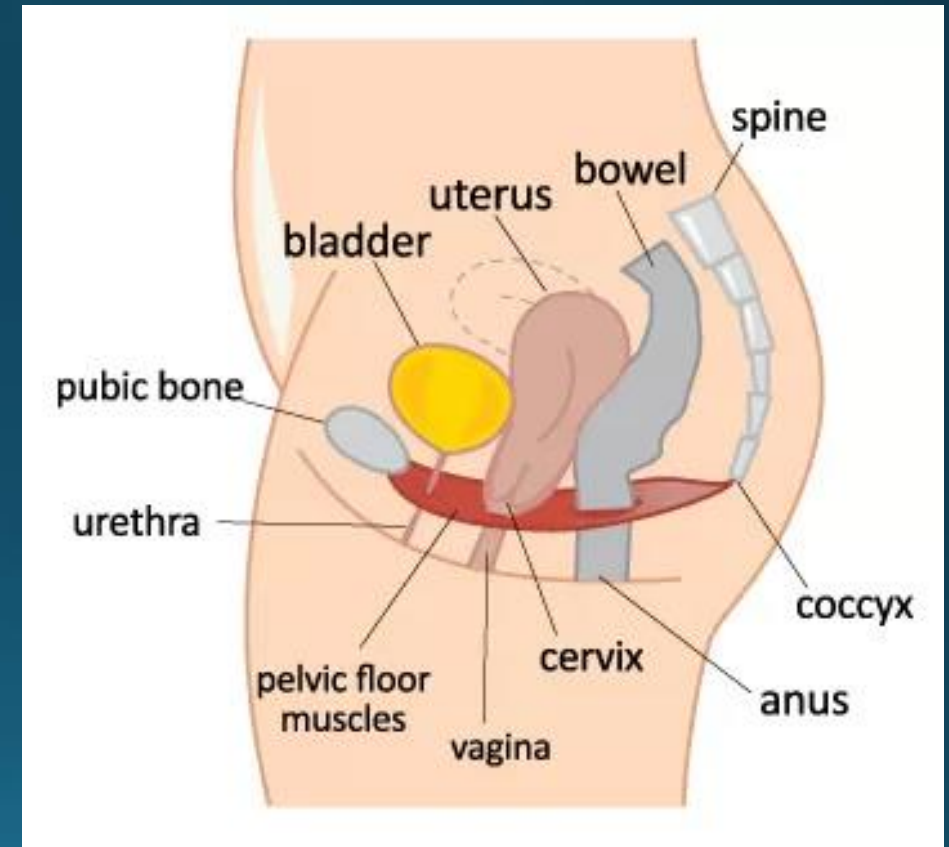
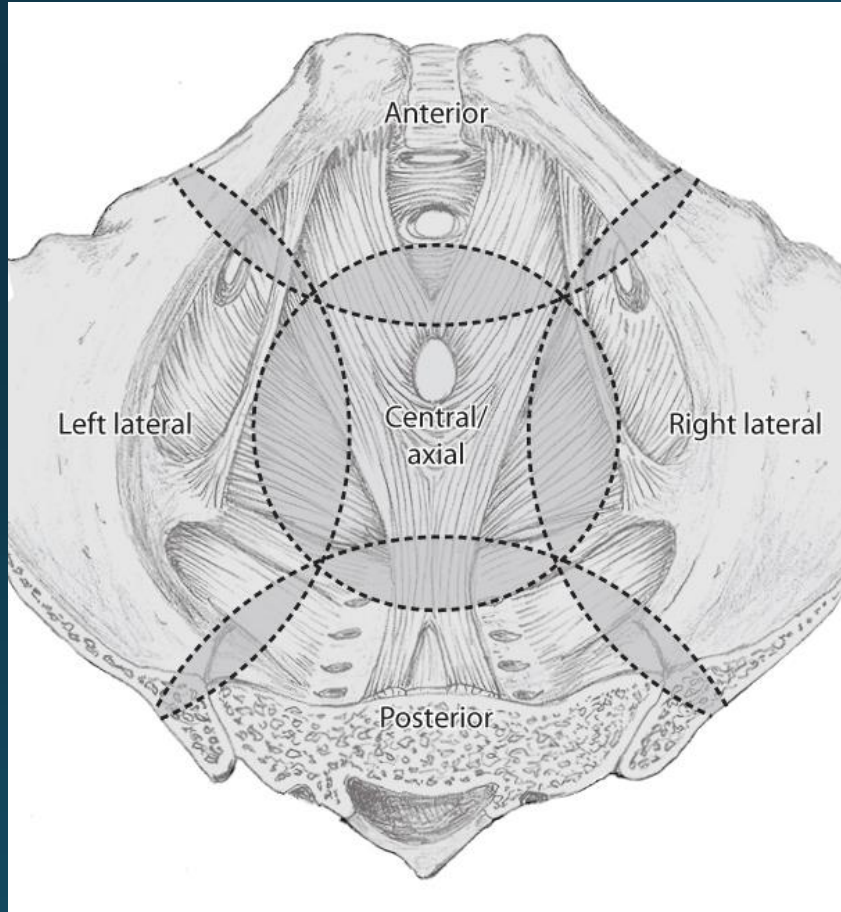
KFSH&RC Experience

RAHA ALAHMADI

Consultant Colorectal & Pelvic Exenteration Surgery
Assistant Professor, Alfaisal University
King Faisal Specialist Hospital & Research Centre



What is Pelvic Exenteration



Evolution of Pelvic Exenteration

- Alexander Brunschwig in 1948 in New York as a palliative procedure for recurrent carcinoma of the cervix.
- 1948 to 1990's little evidence, small cohorts, high mortality exenteration surgery
- Radical Central approaches 1990's
- Radical Posterior composite sacrectomy early 2000's
- Radical Lateral neurovascular approaches 2010

Principle: “if the recurrence abuts it then excise it”



What currently vexes surgical decision-making in achieving the holy grail of an R0 margin is determining not only the resectability of pelvic malignancy but also the radicality of the surgical approach required for the same tumour. Over several decades of progressive and repeated prospective audit in all pelvic compartments, the author and colleagues have adopted a 'sarcoma' policy for RRC: if the recurrence abuts or involves an organ, that organ should be resected en bloc and not 'shaved' free of tumour. This has led to dramatic improvements in R0 rates in the lateral compartment, from 21 to 68 per cent¹⁰, including when sciatic nerve resection occurs (R0 68 per cent)¹¹, common and external iliac vessel resection (R0 74 per cent)¹², and if sacrectomy posteriorly (R0 74 per cent) is required¹³. A recent international benchmark study¹⁴ from 10 French centres and two Australian centres is possibly the only direct comparison between 'radicality concepts'; this study found that a more radical approach to potentially involved structures led to a 35 per cent difference in R0 rates for RRC in both concept and practice (86 versus 51 per cent).


OXFORD

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Leading Article

Redefining the boundaries of advanced pelvic oncology surgery

M. J. Solomon  ^{1,2,3,4,*}

¹Surgical Outcomes Research Centre, Sydney, New South Wales, Australia,

²Institute of Academic Surgery at Royal Prince Alfred Hospital, Sydney, New South Wales, Australia

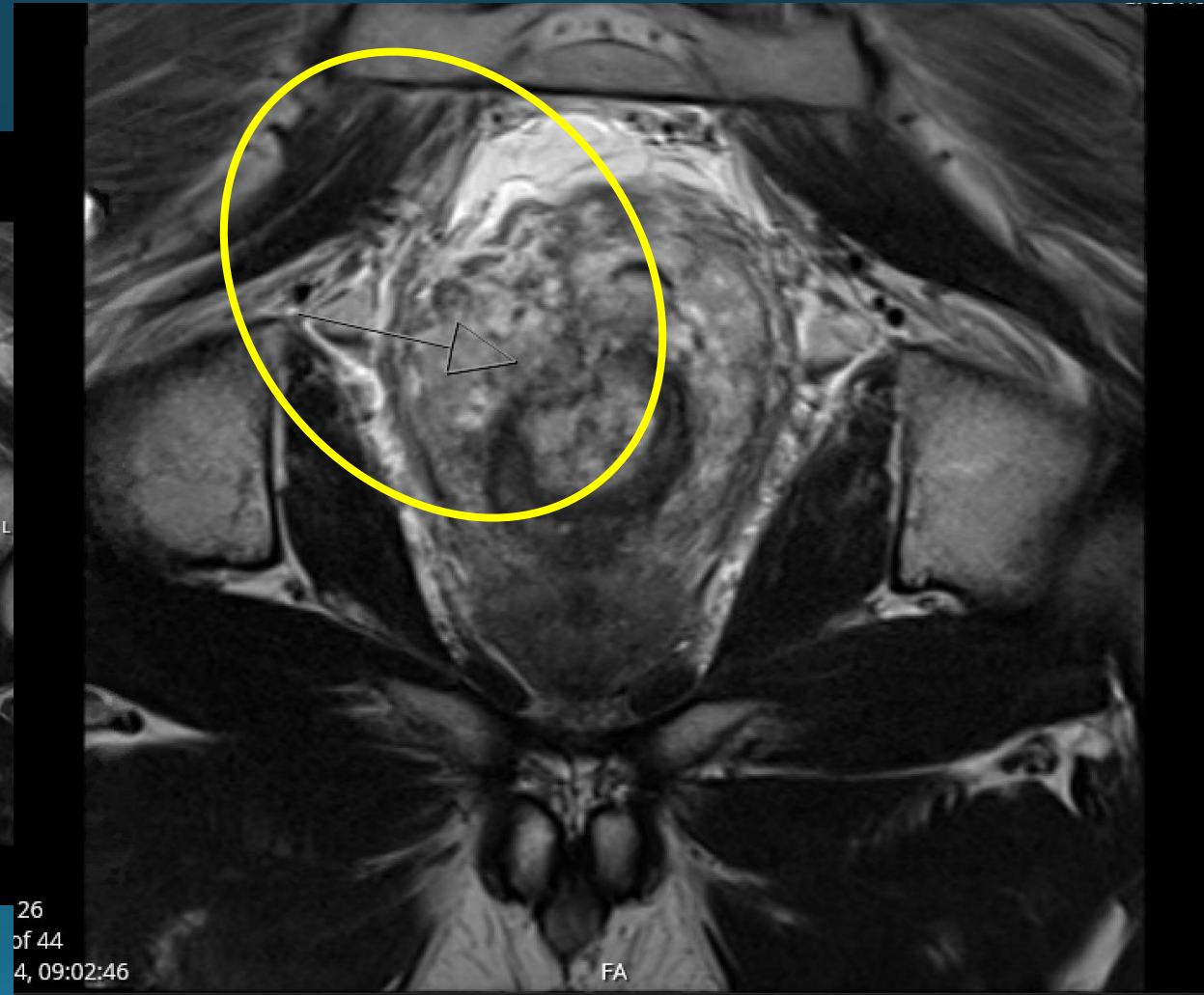
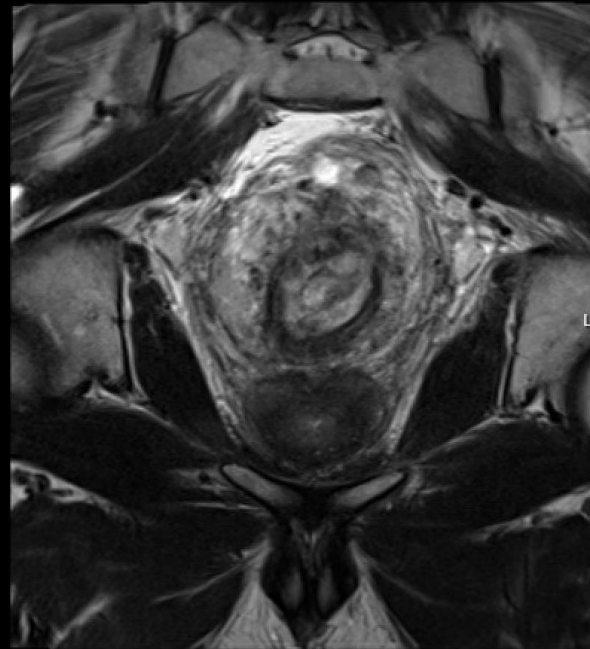
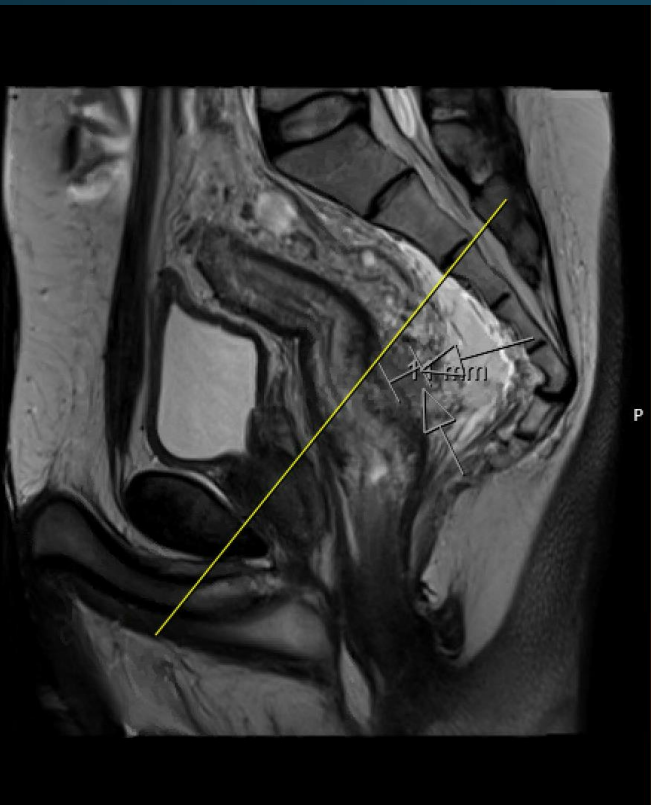
³Department of Colorectal Surgery, Royal Prince Alfred Hospital, Sydney, New South Wales, Australia

⁴Faculty of Medicine and Health Sciences, Central Clinical School, University of Sydney, Sydney, New South Wales, Australia

*Correspondence to: Michael Solomon Suite 415, Level 4 RPA Medical Centre, 100 Carillon Avenue, Newtown, Sydney, NSW, Australia
(e-mail: professor.solomon@sydney.edu.au)

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Pelvic Exenterative Surgeon Perspective



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Outcome & Survival

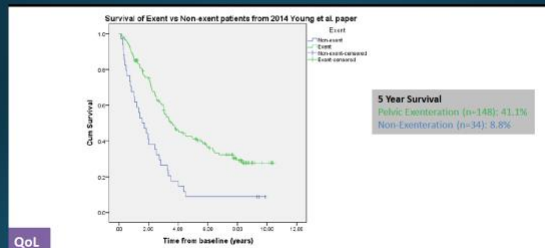
Survival

Surgery vs Palliation

- Less than 9% 5yS without surgery
- Inoperable: 9 months median survival with poor quality of life
- 17 months median survival with palliative chemoradiation
- Only surgery can cure → long term survival

Raha Alahmadi alahmadi@ah@gmail.com

Survival



Raha Alahmadi alahmadi@ah@gmail.com

Surgical, survival and quality of life outcomes in over 1000 pelvic exenterations: lessons learned from a large Australian case series

Daniel Steffens, Michael J. Solomon, Peter Lee, Kirk Austin, Cherry Koh, Christopher Byrne, Sascha Karunaratne, Sophie Hatcher, Kiera Taylor and Kate McBride

Table 4 Overall survival rates accordingly to tumour type (N = 981)

Variables	Primary rectal (N = 209)	Other primary malignancy (N = 154)	Recurrent rectal (N = 321)	Other recurrent malignancy (N = 180)	Non-malignant (N = 33)
Median overall survival, months	139.0 (90.1-187.8)	84.0 (46.9-121.0)	50.0 (42.2-57.7)	50.0 (30.3-69.6)	-*
Overall survival rates					
12-Months	90.1%	84.9%	90.9%	75.7%	100%
24-Months	79.7%	75.4%	76.6%	62.2%	96.4%
60-Months	66.5%	56.5%	44.6%	45.1%	83.9%
120-Months	50.0%	44.6%	34.3%	37.4%	78.6%
Median follow-up time, months	40.5 (16.7-75.0)	35.5 (16.2-84.0)	35.0 (19.0-63.0)	26.0 (11.0-64.5)	66.0 (31.7-136.5)

*Unable to estimate.

Raha Alahmadi alahmadi@ah@gmail.com

Recent reports from the PelvEx Collaborative, have corroborated that R0 pelvic exenteration may offer the best chance of long-term overall survival in patients with locally advanced primary rectal cancer (median overall survival = 43 months [R0]),⁶ locally recurrent rectal cancer

(median overall survival = 36 months [R0]), and non-rectal pelvic malignancies (median overall survival (range) = 30-44 months [R0]).⁷

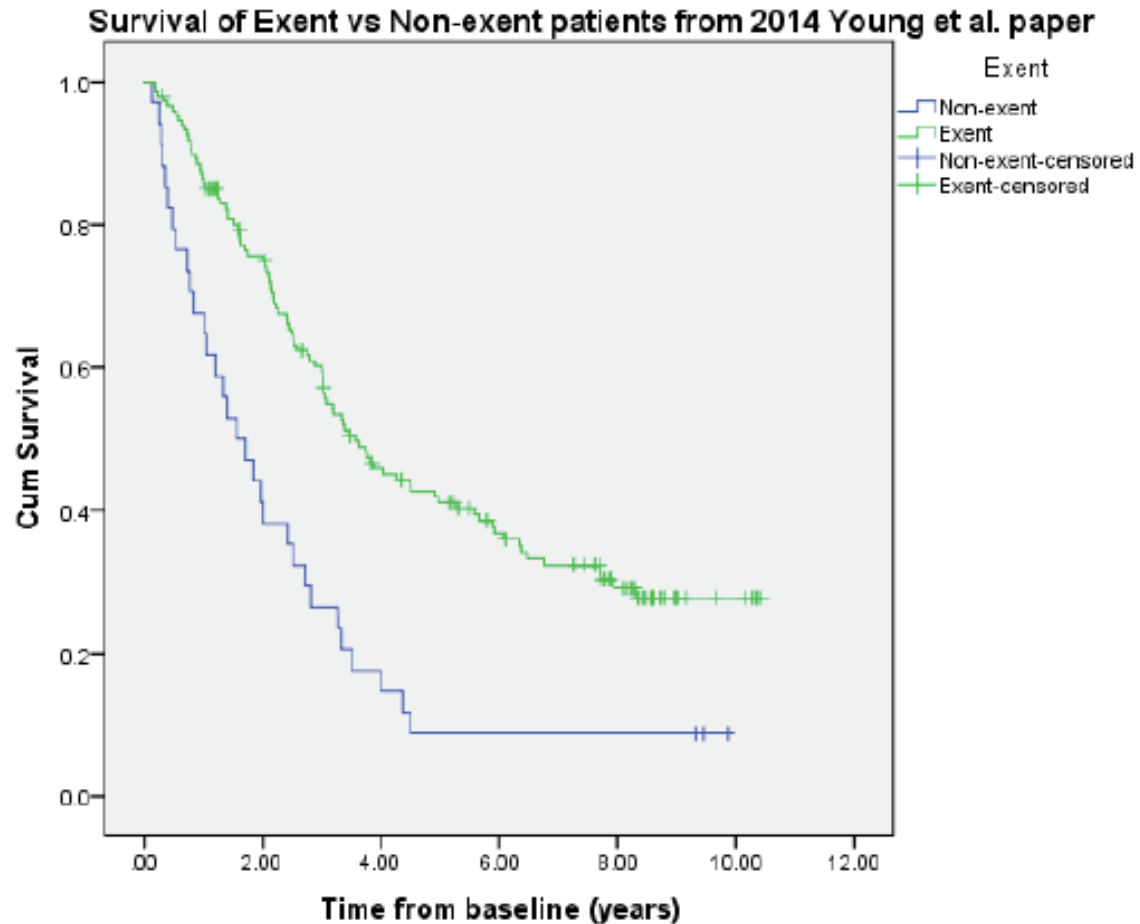
6. PelvEx Collaborative. Surgical and survival outcomes following pelvic exenteration for locally advanced primary rectal cancer: results from an international collaboration. *Ann. Surg.* 2019; **269**: 315-21.

7. PelvEx Collaborative. Factors affecting outcomes following pelvic exenteration for locally recurrent rectal cancer. *Br. J. Surg.* 2018; **105**: 650-7.

Surgery vs Palliation

- Less than 9% 5yS without surgery
- Inoperable: 9 months median survival with poor quality of life
- 17 months median survival with palliative chemoradiation
- Only surgery can cure → long term survival

Survival



5 Year Survival

Pelvic Exenteration (n=148): 41.1%

Non-Exenteration (n=34): 8.8%

Surgical, survival and quality of life outcomes in over 1000 pelvic exenterations: lessons learned from a large Australian case series

Daniel Steffens ^{ID, *†‡} Michael J. Solomon ^{ID, *†‡§} Peter Lee, ^{*†§} Kirk Austin, ^{*§} Cherry Koh ^{ID, *†‡§}
 Christopher Byrne, ^{*§} Sascha Karunaratne ^{ID, *†‡} Sophie Hatcher, ^{*§} Kiera Taylor^{*†} and Kate McBride ^{ID*†‡}

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*Unable to estimate.

PelvEx Collaborative

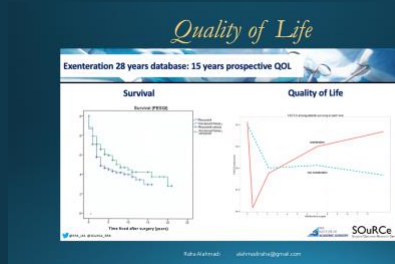
- PelvEx Collaborative is an international collaborative group involving over 140 units across five continents with the aim to examine outcomes for patients who have had pelvic exenterative surgery
- The main purpose is to analyse prospectively on a large scale the results of patients undergoing pelvic exenteration:
 - define guidelines to optimise patient protocols and treatment strategies.
 - surgical outcomes and survival.

Recent reports from the PelvEx Collaborative, have corroborated that R0 pelvic exenteration may offer the best chance of long-term overall survival in patients with locally advanced primary rectal cancer (median overall survival = 43 months [R0]),⁶ locally recurrent rectal cancer (median overall survival = 36 months [R0]), and non-rectal pelvic malignancies (median overall survival (range) = 30–44 months [R0]).⁷

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Outcome & Quality of Life



En-Bloc Pubic Bone Excision

Outcomes of Pelvic Exenteration with en Bloc Partial or Complete Pubic Bone Excision for Locally Advanced Primary or Recurrent Pelvic Cancer

Kirk K. S. Austin, B.Sc., A.F.R.C.S.I., F.R.A.C.S.^{1,2}
Andrew J. Herd, B.Sc., M.B., Ch.B., F.R.A.C.S.^{1,2}
Michael J. Solomon, M.Sc., F.R.C.S.I., F.R.A.C.S.^{1,2,3,4}
Ken Ly, B.Sc. (Hons.), Peter J. Lee, M.B.B.S., M.S., F.R.A.C.S.^{1,2}

¹ Department of Colorectal Surgery, Royal Prince Alfred Hospital, Camperdown, New South Wales, Australia
² Stags of Oncology Research Centre (StOARC), Royal Prince Alfred Hospital, Camperdown, New South Wales, Australia
³ Division of Academic Surgery at Royal Prince Alfred Hospital, Camperdown, New South Wales, Australia
⁴ Division of Surgery, University of Sydney, New South Wales, Australia

Out of 29 Patients

- Microscopically clear resection margins (R0) were achieved in 22 patients (76%). Six patients (21%) had a microscopically positive (R1) margin.
- The most common complication in this cohort was development of a pelvic collection that occurred in 13 patients (41%) of which 11 were successfully managed with a percutaneous drain.
- Five-year overall survival was 53%

Sciatic and Femoral Nerve Resection During Extended Radical Surgery for Advanced Pelvic Tumours

Long-term Survival, Functional, and Quality-of-life Outcomes

Kirk K. S. Austin, M.B.Ch.B., Michael J. Solomon, M.B.Ch.B., F.R.C.S.I., F.R.A.C.S.I., Peter J. Lee, M.B.B.S., M.S., F.R.A.C.S.I., Andrew J. Herd, M.B.Ch.B., F.R.C.S.I., F.R.A.C.S.I.

- 68 patients (9.5%) had en bloc sciatic or femoral nerve resection as part of their operation.
- In 63 patients who underwent surgery with curative intent, R0 margins were achieved in 41 patients (65%).
- The overall 5-year survival for all patients undergoing surgery with curative intent was 49%, and the median survival was 46 months (95% confidence interval (CI) 10.4–81.6).
- R0 resection was associated with a higher rate of 5-year overall survival, compared with patients with involved margins (55% vs 23%; P=0.006).

Functional Outcomes and Quality of Life

The majority of patients (91%) who had complete sciatic nerve resection had a foot drop postoperatively; however, almost all (99%) were able to mobilize independently with or without the use of a walking aid/frame, walking stick, or crutch (Table 4). Foot drop was less common in patients who had partial sciatic nerve resection (25%), and 92% could mobilize independently. All 4 patients who underwent complete femoral nerve resection were able to mobilize using a knee brace and walking aid before discharge from hospital.

	Complete Sciatic Nerve (n = 26)	Partial Sciatic Nerve (n = 30)
Foot drop	19 (73)	7 (23)
Independent mobility	6 (23)	16 (53)
Independent mobility with aid	14 (53)	9 (30)
Walking frame	1 (4)	2 (7)
Neurologic pain	11 (42)	20 (67)

*Statistical significance represents valid comparisons.
†Data missing for 125 to 175 patients.
‡Data missing for 185 to 425 patients.

Sacral Resection With Pelvic Exenteration for Advanced Primary and Recurrent Pelvic Cancer: A Single-Institution Experience of 100 Sacrectomies

Tommy Milne, B.Sc., M.B.B.S. (Hons.),^{1,2} Michael J. Solomon, M.B.Ch.B. (Hons.), M.Sc., F.R.A.C.S., F.R.C.S.I.^{1,2,3}, Peter Lee, M.B.B.S., B.Sc., F.R.A.C.S.^{1,2}, Jane M. Young, M.B.B.S., M.Phil., Ph.D., F.R.C.S.I.,^{1,2} Paul Stalley, M.B.B.S. (Hons.), F.R.A.C.S., F.A.C.M.D.,⁴ James D. Harrison, M.Phil., Ph.D.,⁵ Kirk K. S. Austin, B.Sc., A.F.R.C.S.I., F.R.A.C.S.I.^{1,2}

¹ Stags of Oncology Research Centre, Sydney Local Health District and Sydney School of Public Health, University of Sydney, Sydney, New South Wales, Australia
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³ Division of Surgery, University of Sydney, Sydney, New South Wales, Australia
⁴ Centre for Epidemiology and Biostatistics, Sydney School of Public Health, University of Sydney, Sydney, New South Wales, Australia
⁵ Department of Orthopaedic Surgery, Royal Prince Alfred Hospital, Sydney, New South Wales, Australia

Survival After Surgery With Curative Intent

A clear surgical margin (R0) conferred a significant improvement in disease-free survival (p = 0.006). Median disease-free survival was 39 months, and disease-free survival rates were 76% at 1 year, 52% at 3 years, and 40% at 5 years (Fig. 1). In addition, R0 resection granted a large improvement in overall survival compared with R1/2 resection (p = 0.011). Median overall survival was 45 months, with 1-year, 3-year, and 5-year survival rates of 92%, 68%, and 46%, respectively.

Age Limit

Elderly Patients Have Better Quality of Life but Worse Survival Following Pelvic Exenteration: A 25-Year Single-Center Experience

Raha Alahmadi, MD,¹ David Stiffen, PhD,^{2,3} Michael J. Solomon, MD,^{1,2,4} Peter J. Lee, MD, F.R.A.C.S., MD,^{1,2,4} Kirk K. S. Austin, MD,^{1,2} and Cherry H. Koh, MD,^{1,2,4}

¹Department of Colorectal Surgery, Royal Prince Alfred Hospital, Sydney, New South Wales, Australia; ²Stags of Oncology Research Centre (StOARC), Royal Prince Alfred Hospital, University of Sydney, Sydney Local Health District, New South Wales, Australia; ³Faculty of Medicine and Health, Central Clinical School, University of Sydney, Sydney, New South Wales, Australia; ⁴Division of Academic Surgery, Sydney Local Health District, Sydney, New South Wales, Australia

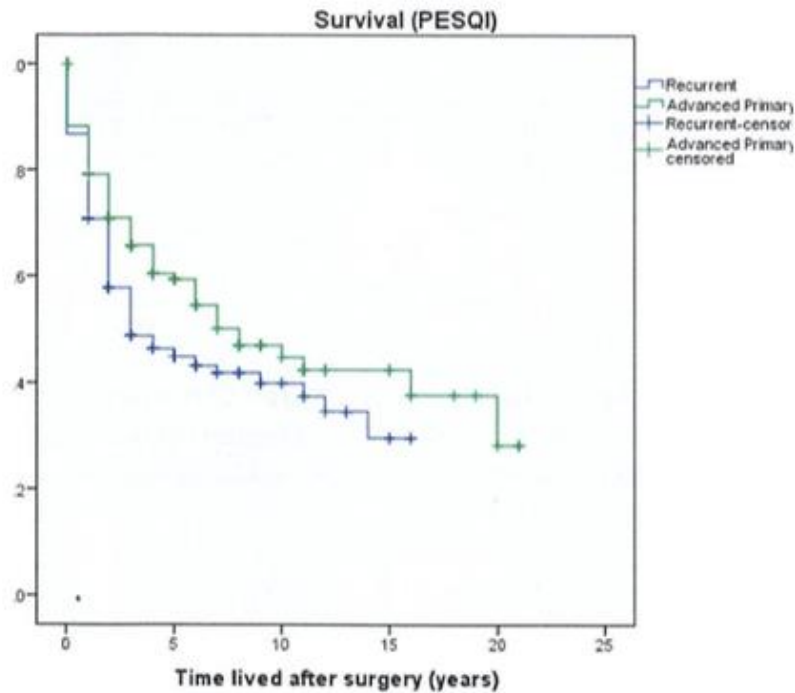
CONCLUSIONS

This study demonstrates the benefit of offering exenteration surgery to older patients. Older patients most likely have shorter overall survival because of higher cardiovascular risk and ASA scores in this population, not because of poorer cancer outcomes. In addition, the QoL findings show that older patients have equal or better outcomes than their younger counterparts. Collectively, these findings support the provision of PE surgery to patients with advanced primary or recurrent rectal cancer regardless of age. In addition, further evaluation of extending the age limit to beyond 80 due to the positive findings seen in subgroup analyses of this study could be considered.

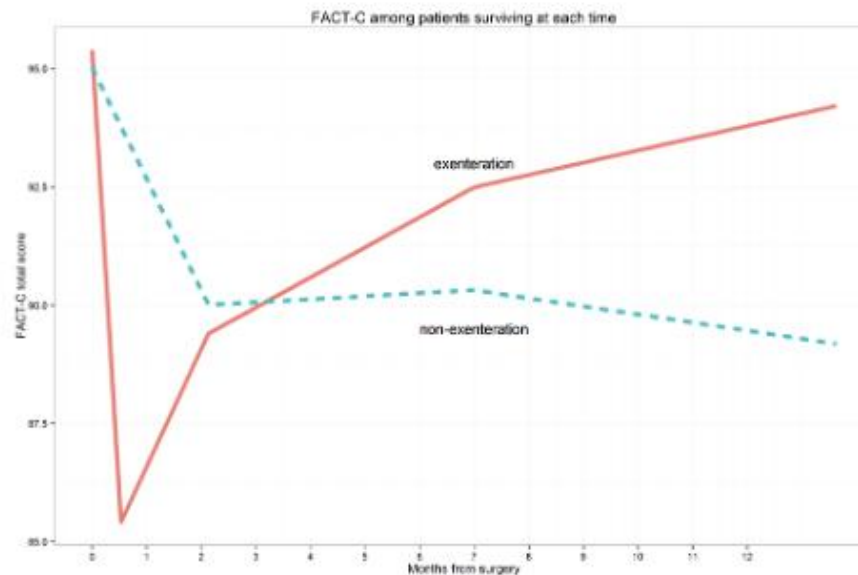
Quality of Life

Exenteration 28 years database: 15 years prospective QOL

Survival



Quality of Life



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ACADEMIC SURGERY

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En-Bloc Pubic Bone Excision

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1 Department of Colorectal Surgery, Royal Prince Alfred Hospital, Camperdown, New South Wales, Australia

2 Surgical Outcomes Research Centre (SOuRCe), Royal Prince Alfred Hospital, Camperdown, New South Wales, Australia

3 Institute of Academic Surgery at Royal Prince Alfred Hospital, Camperdown, New South Wales, Australia

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- Five-year overall survival was 53%

Sciatic and Femoral Nerve Resection During Extended Radical Surgery for Advanced Pelvic Tumours

Long-term Survival, Functional, and Quality-of-life Outcomes

Kilian G. M. Brown, MBBS,†‡ Michael J. Solomon, DMedSc, FRACS,*†‡§ Yee Chen Lau, FRACS,*† Daniel Steffens, PhD,†§ Kirk K. S. Austin, FRACS,*†‡ and Peter J. Lee, FRACS, MS*†‡*

- 68 patients (9.5%) had en bloc sciatic or femoral nerve resection as part of their operation.
- In 63 patients who underwent surgery with curative intent, R0 margins were achieved in 41 patients (65%).
- The overall 5-year survival for all patients undergoing surgery with curative intent was 49%, and the median survival was 46 months [95% confidence interval (CI) 10.4–81.6].
- R0 resection was associated with a higher rate of 5-year overall survival, compared with patients with involved margins (55% vs 23%; P $\frac{1}{4}$ 0.006).

Functional Outcomes and Quality of Life

The majority of patients (91%) who had complete sciatic nerve resection had a foot drop postoperatively; however, almost all (96%) were able to mobilize independently with or without the use of a walking aid (frame, walking stick, or crutch) (Table 4). Foot drop was less common in patients who had partial sciatic nerve resection (32%), and 92% could mobilize independently. All 4 patients who underwent complete femoral nerve transection were able to mobilize using a knee brace and walking aid before discharge from hospital.

TABLE 4. Functional Outcomes After Sciatic or Femoral Nerve Resection During Pelvic Exenteration

	Complete Sciatic Nerve (n = 26)*	Partial Sciatic Nerve (n = 38)†
Foot drop	19 (91)	7 (32)
Independent mobility	8 (35)	16 (59)
Independent mobility with aid	14 (61)	9 (33)
Wheelchair bound	1 (4)	2 (7)
Neuropathic pain	11 (52)	20 (65)

Numbers in parentheses represent valid percentages.

*Data missing for 12% to 19% patients.

†Data missing for 18% to 42% patients.

Sacral Resection With Pelvic Exenteration for Advanced Primary and Recurrent Pelvic Cancer: A Single-Institution Experience of 100 Sacrectomies

Tony Milne, B.Sc., M.B.B.S. (Hons.)^{1,2} • Michael J. Solomon, M.B.B.C.H. (Hons.), M.Sc., F.R.A.C.S., F.R.C.S.I.^{1,2,3} • Peter Lee, M.B.B.S., B.Sc., F.R.A.C.S.^{1,2} • Jane M. Young, M.B.B.S., M.P.H, Ph.D., F.A.F.P.H.M.^{1,4} • Paul Stalley, M.B.B.S. (Hons.), F.R.A.C.S., F.A.Orth.A.⁵ James D. Harrison, M.P.H., Ph.D.¹ • Kirk K. S. Austin, B.Sc., A.F.R.C.S.I., F.R.A.C.S.^{1,2}

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2 Department of Colorectal Surgery, Royal Prince Alfred Hospital, Sydney, New South Wales, Australia

3 Discipline of Surgery, University of Sydney, Sydney, New South Wales, Australia

4 Cancer Epidemiology and Services Research, Sydney School of Public Health, University of Sydney, Sydney, New South Wales, Australia

5 Department of Orthopaedic Surgery, Royal Prince Alfred Hospital, Sydney, New South Wales, Australia

- Out of 92 patients, clear margins (R0) were achieved in 72 patients and in 76% of curative operations.

Survival After Surgery With Curative Intent

A clear surgical margin (R0) conferred a significant improvement in disease-free survival ($p = 0.006$). Median disease-free survival was 39 months, and disease-free survival rates were 76% at 1 year, 52% at 3 years, and 40% at 5 years (Fig. 1). In addition, R0 resection granted a large improvement in overall survival compared with R1/2 resection ($p = 0.011$). Median overall survival was 45 months, with 1-year, 3-year, and 5-year survival rates of 92%, 68%,



Age Limit

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Annals of

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OFFICIAL JOURNAL OF THE SOCIETY OF SURGICAL ONCOLOGY



ORIGINAL ARTICLE – COLORECTAL CANCER

Elderly Patients Have Better Quality of Life but Worse Survival Following Pelvic Exenteration: A 25-Year Single-Center Experience

Raha Alahmadi, MD¹, Daniel Steffens, Ph.D^{2,3}, Michael J. Solomon, MD^{1,2,3,4}, Peter J. Lee, MD, FRACS, MS^{1,2,4}, Kirk K. S. Austin, MD^{1,2}, and Cherry E. Koh, MD^{1,2,3,4}

¹Department of Colorectal Surgery, Royal Prince Alfred Hospital, Sydney, New South Wales, Australia; ²Surgical Outcomes Research Centre (SOuRCe), Royal Prince Alfred Hospital, University of Sydney, Sydney Local Health District, New South Wales, Australia; ³Faculty of Medicine and Health, Central Clinical School, University of Sydney, Sydney, New South Wales, Australia; ⁴RPA Institute of Academic Surgery, Sydney Local Health District, Sydney, New South Wales, Australia

Many recent studies have shown improvement in QoL after PE during early follow-up of at least 2 months after surgery, with a return to baseline or a level comparable to that of a healthy population by the end of the first year

CONCLUSIONS




This study demonstrates the benefit of offering exenteration surgery to older patients. Older patients most likely have shorter overall survival because of higher cardiovascular risk and ASA scores in this population, not because of poorer cancer outcomes. In addition, the QoL findings show that older patients have equal or better outcomes than their younger counterparts. Collectively, these findings support the provision of PE surgery to patients with advanced primary or recurrent rectal cancer regardless of age. In addition, further evaluation of extending the age limit to beyond 80 due to the positive findings seen in subgroup analyses of this study could be considered.

Complications

Complications

Type of Morbidity	Total (n=329)	Percentage
Enterocutaneous Fistula	9	3%
Small Bowel Obstruction	19	6%
Urinary Conduit Leak	28	9%
Wound infection	54	16%
Compartment Syndrome	3	1%
Myocutaneous flap wound dehiscence	21	6%
Myocutaneous Flap Necrosis	9	3%
DVT/PE	29	9%
Respiratory	73	22%
Cardiac	59	18%
Prolonged ileus	47	14%
Pelvic collection	51	16%
Major post-operative bleed	7	2%
Osteomyelitis	6	2%
Wound dehiscence	48	15%
Superficial	39	12%
Deep	9	3%

“Empty Pelvis Syndrome”

- Pelvic collection  leakage
wound dehiscence
- SBO/ileus  enterocutaneous fistula
- NO pelvic floor  hernia

Flap vs primary closure +/- mesh

[Br J Surg.](#) 2024 Mar; 111(3): znae042.

Published online 2024 Mar 8. doi: [10.1093/bjs/znae042](https://doi.org/10.1093/bjs/znae042)

PMCID: PMC10921833

PMID: [38456677](https://pubmed.ncbi.nlm.nih.gov/38456677/)

The empty pelvis syndrome: a core data set from the PelvEx collaborative

PelvEx Collaborative

The empty pelvis syndrome encompasses a spectrum of post-exenteration complications including infected fluid collections, bowel obstruction, perineal sinus, and fistulas—severity is multifactorial, likely due to radicality of resection and migration of bowel into the void generated.

Addressing the empty pelvic syndrome following total pelvic exenteration: does mesh reconstruction help?

P. Lee^{*†‡}, W. J. Tan^{*†}, K. G. M. Brown^{*†‡} and M. J. Solomon^{*†‡§}

^{*}Department of Colorectal Surgery, Royal Prince Alfred Hospital, Sydney, Australia, [†]Surgical Outcomes Research Centre (SORC), Sydney, New South Wales, Australia, [‡]Institute of Academic Surgery at RPA, Sydney, New South Wales, Australia, and [§]University of Sydney, Sydney,

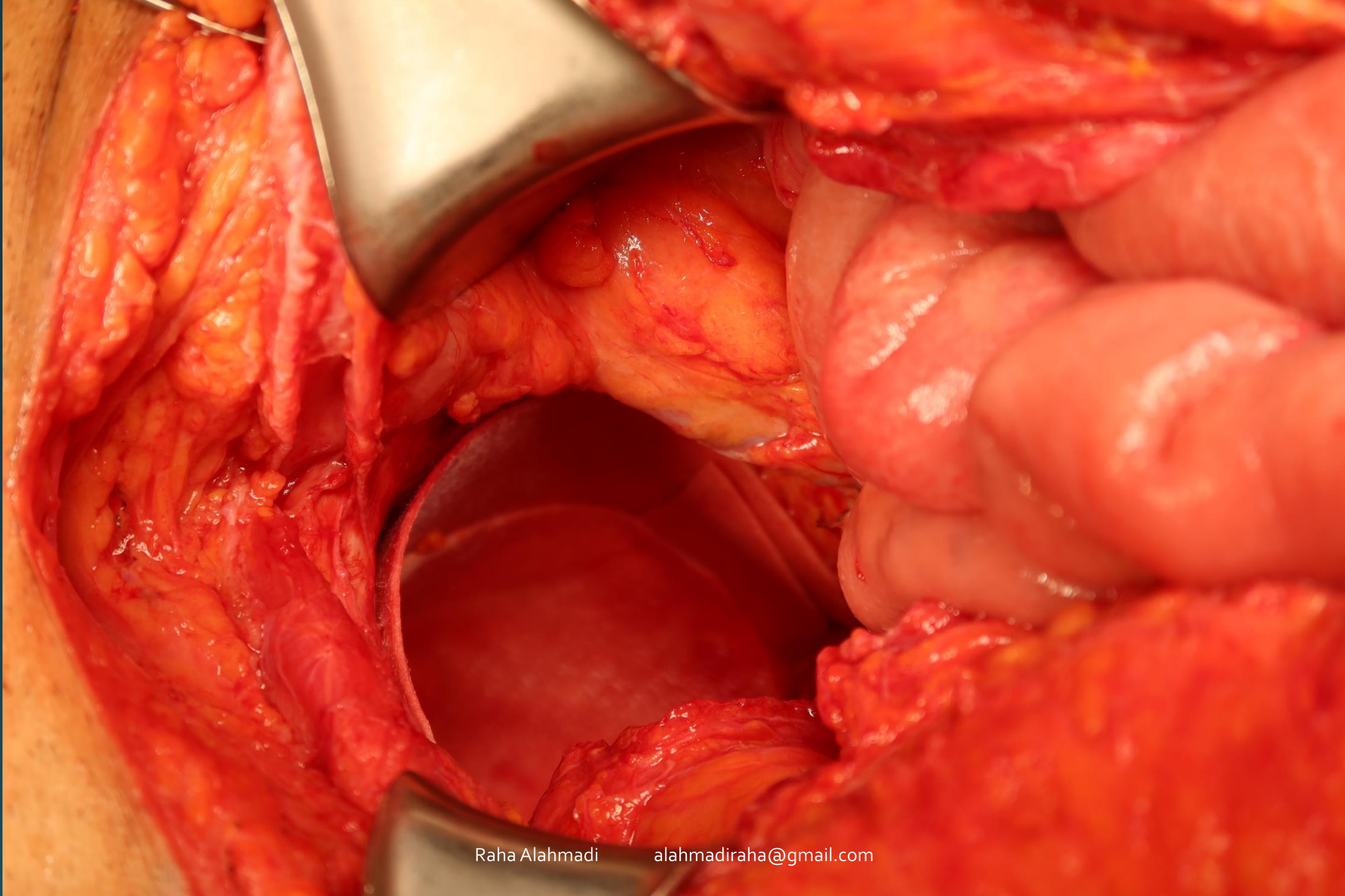
12 months later

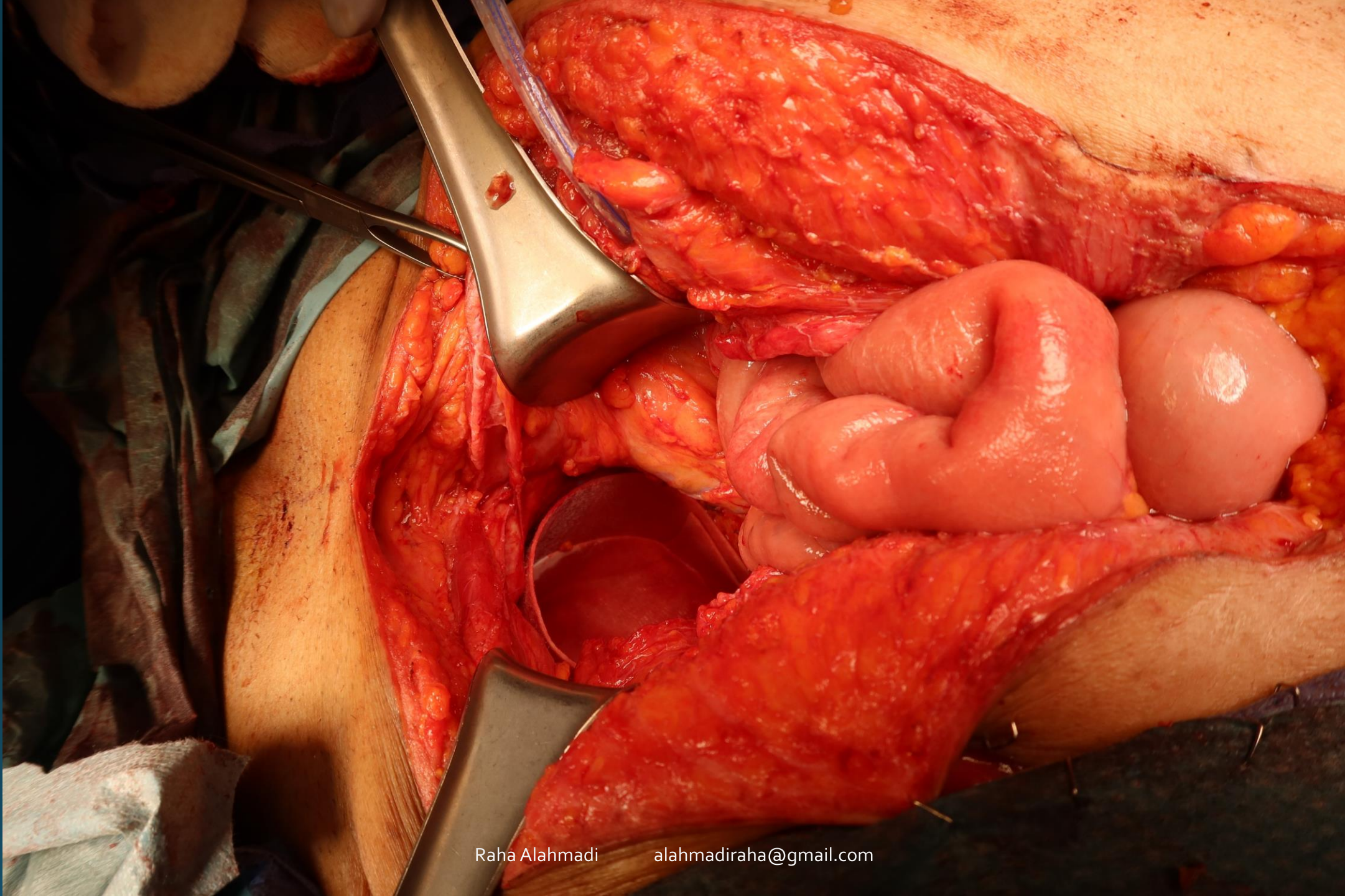


Raha Alahmadi

alahmadiraha@gmail.com

edition





Reconstruction of Pelvic Floor With Biodegradable Mesh



Khameas



F

Alzeyad, Saleh, Mohsen Khameas
5458117



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Image no: 43
Image 43 of 85
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PelvEx Collaborative

- PelvEx Collaborative is an international collaborative group involving over 140 units across five continents with the aim to examine outcomes for patients who have had pelvic exenterative surgery
- The main purpose is to analyse prospectively on a large scale the results of patients undergoing pelvic exenteration:
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 - surgical outcomes and survival.

KFSH&RC Joined PelvEx Collaborative

WELCOME TO BORDEAUX
PelvEx 2023



26 countries

ARGENTINA	NEW ZELAND
AUSTRALIA	NORWAY
BELGIUM	PORTUGAL
BRAZIL	ROMANIA
CANADA	SAUDI ARABIA
DENMARK	SCOTLAND
FRANCE	SINGAPORE
GERMANY	SPAIN
GREECE	SWEDEN
HONG KONG	THE NETHERLANDS
INDIA	TURKEY
IRELAND	UK
ITALY	USA

PELVEX 2023, 29th & 30th June , Bordeaux, France

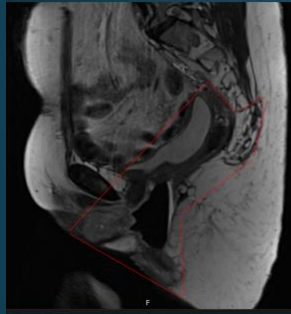


KFSH & RC Experience

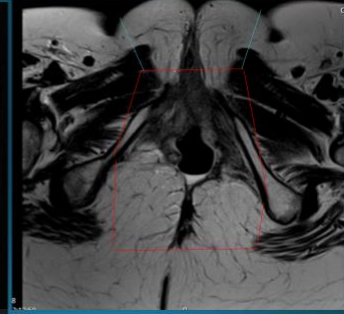
Case 1



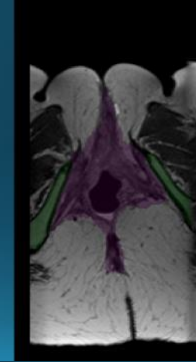
Perineal Tumor and Lines Of Resection



Lines Of Resection Of The Pubic Bone And Labia

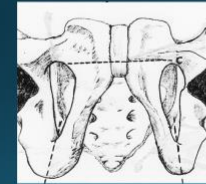


3D Module

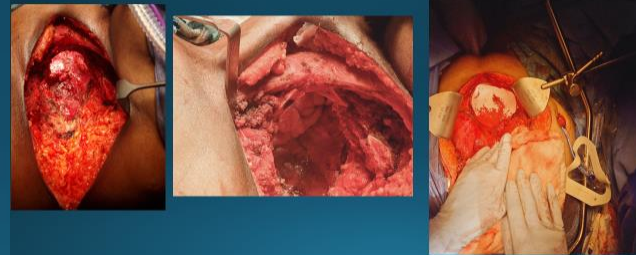
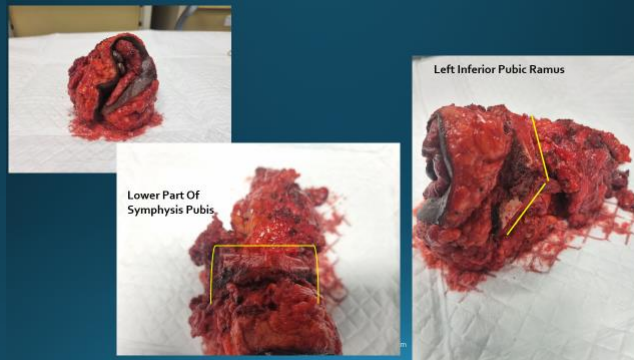


Partial Pubic Bone

Diagramatic



Transection Lines

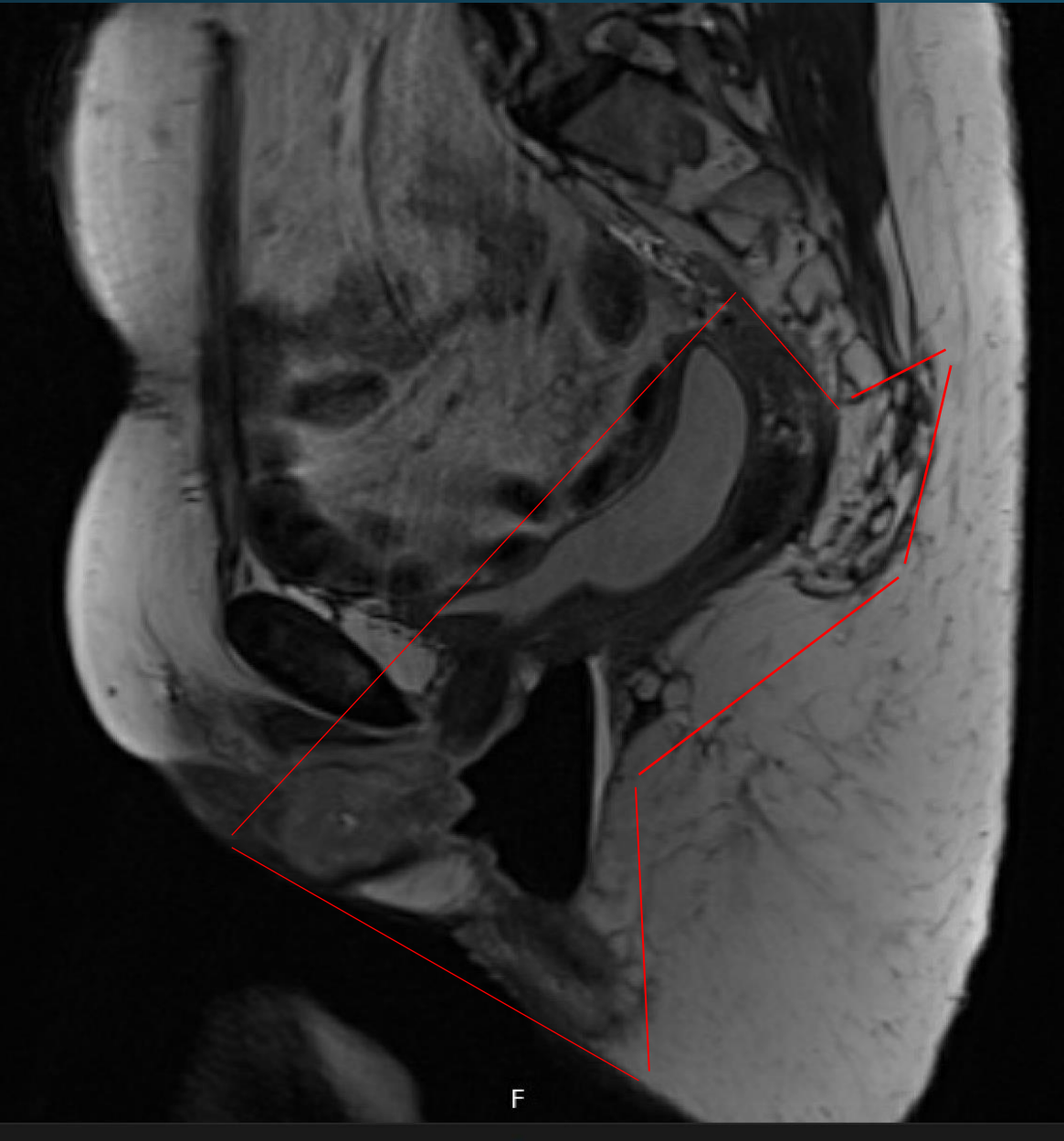




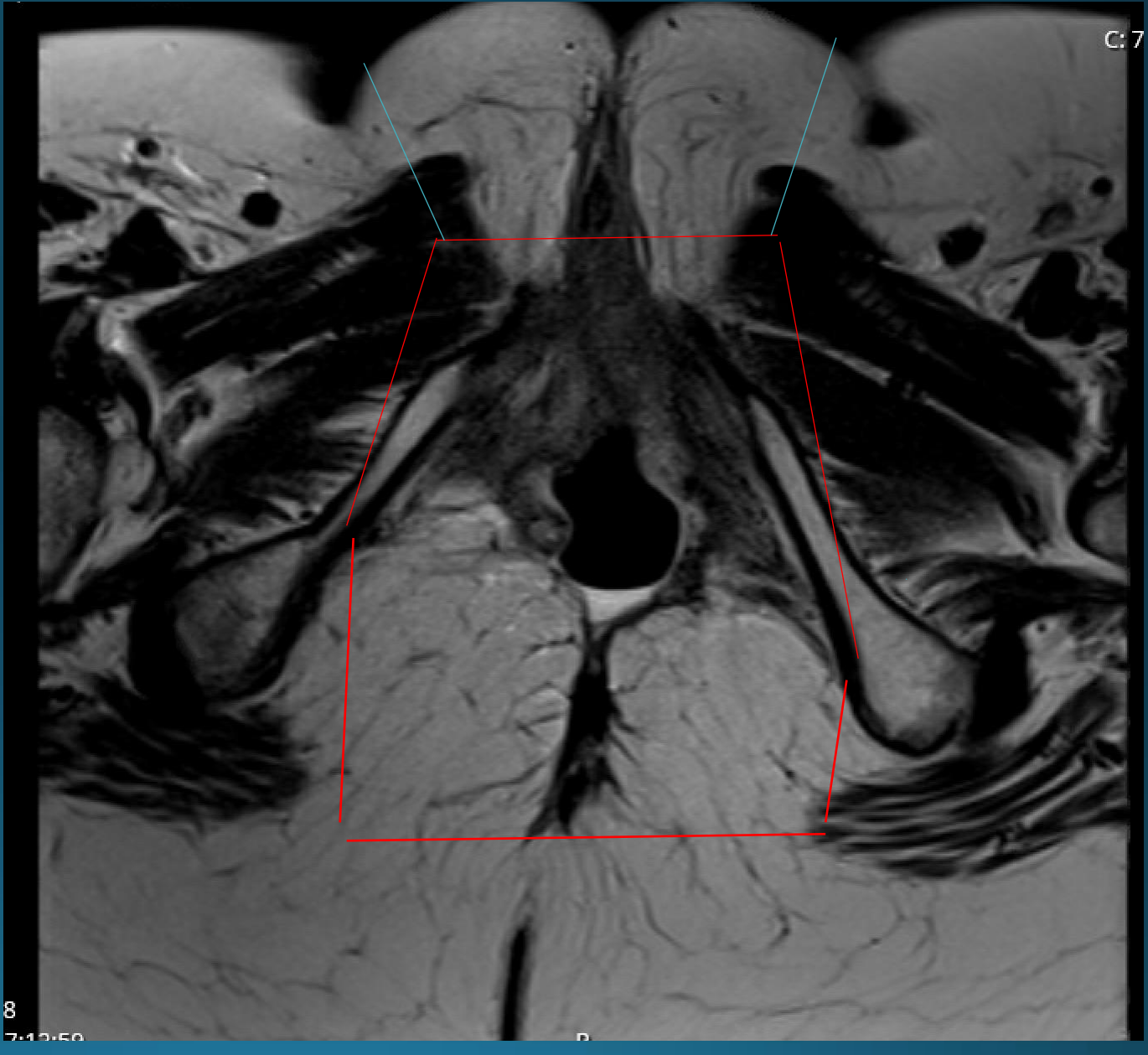
Raha Alahmadi

alahmadiraha@gmail.com

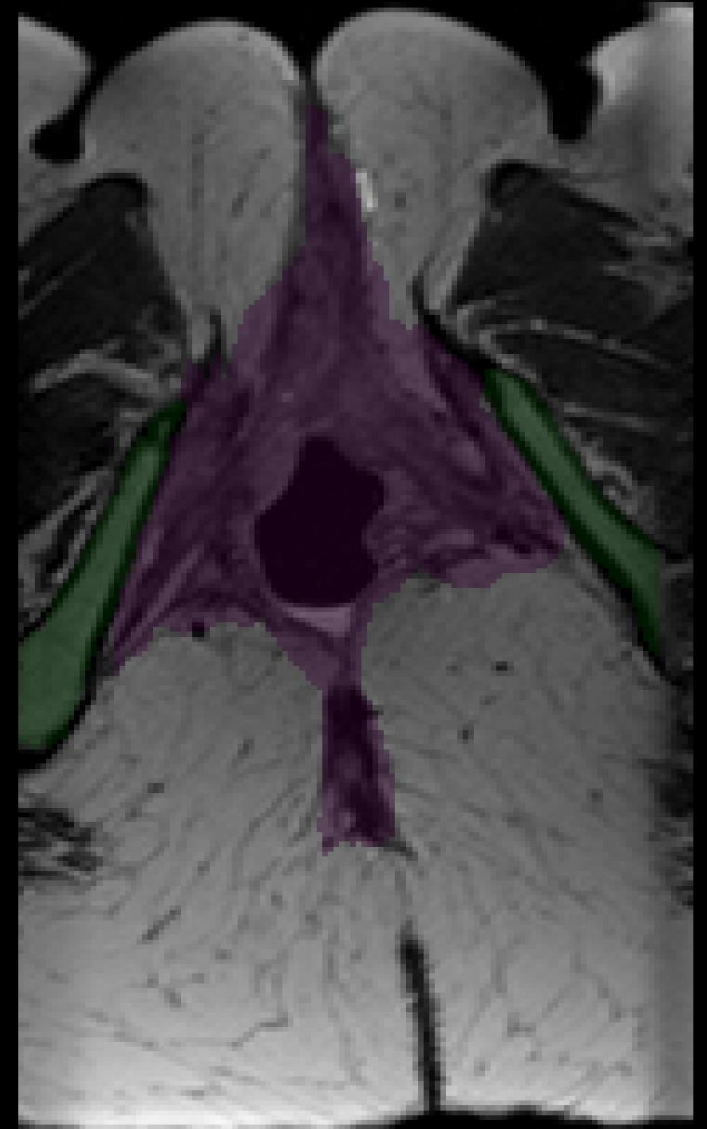
Perineal Tumor and Lines Of Resection

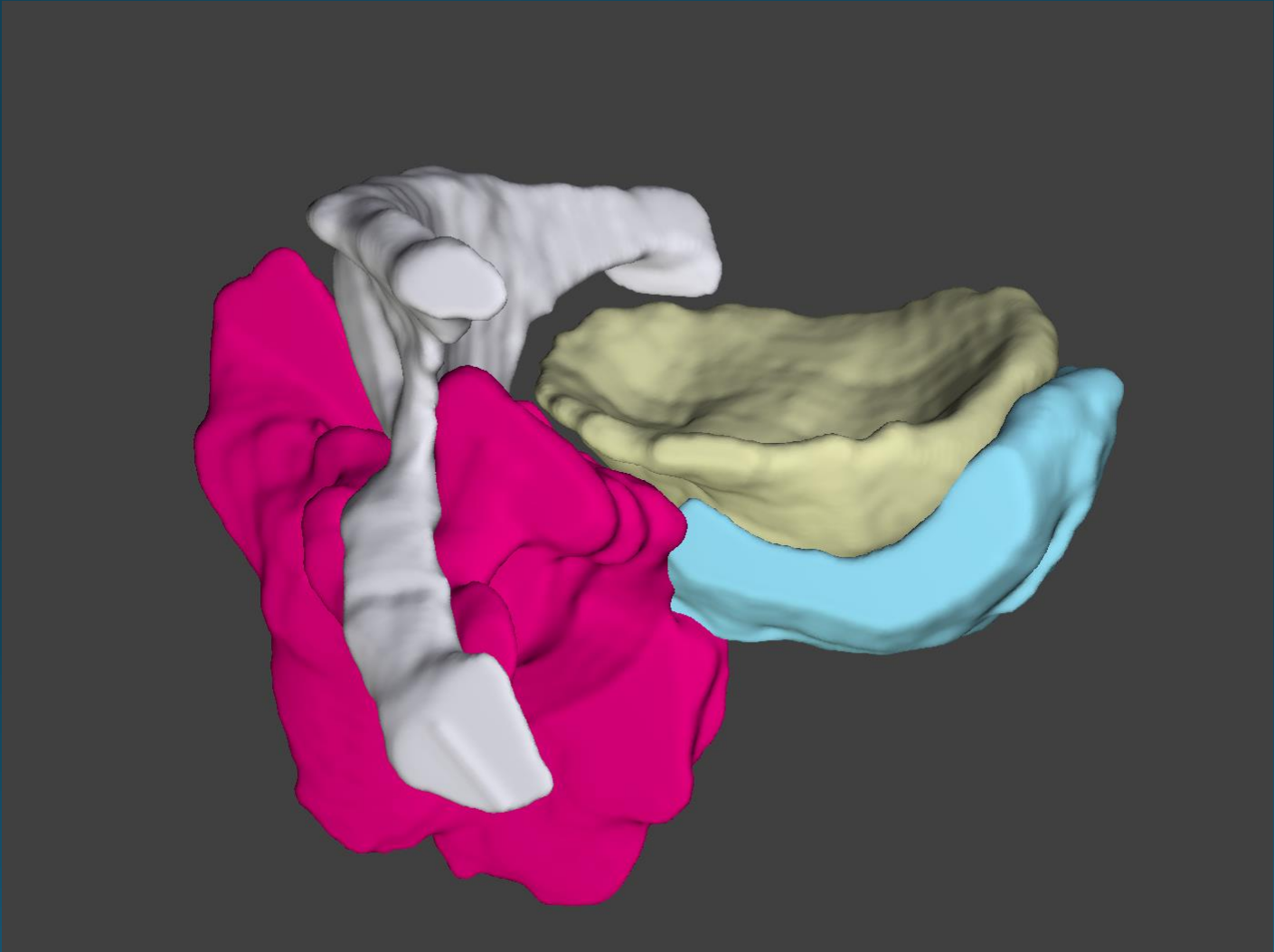


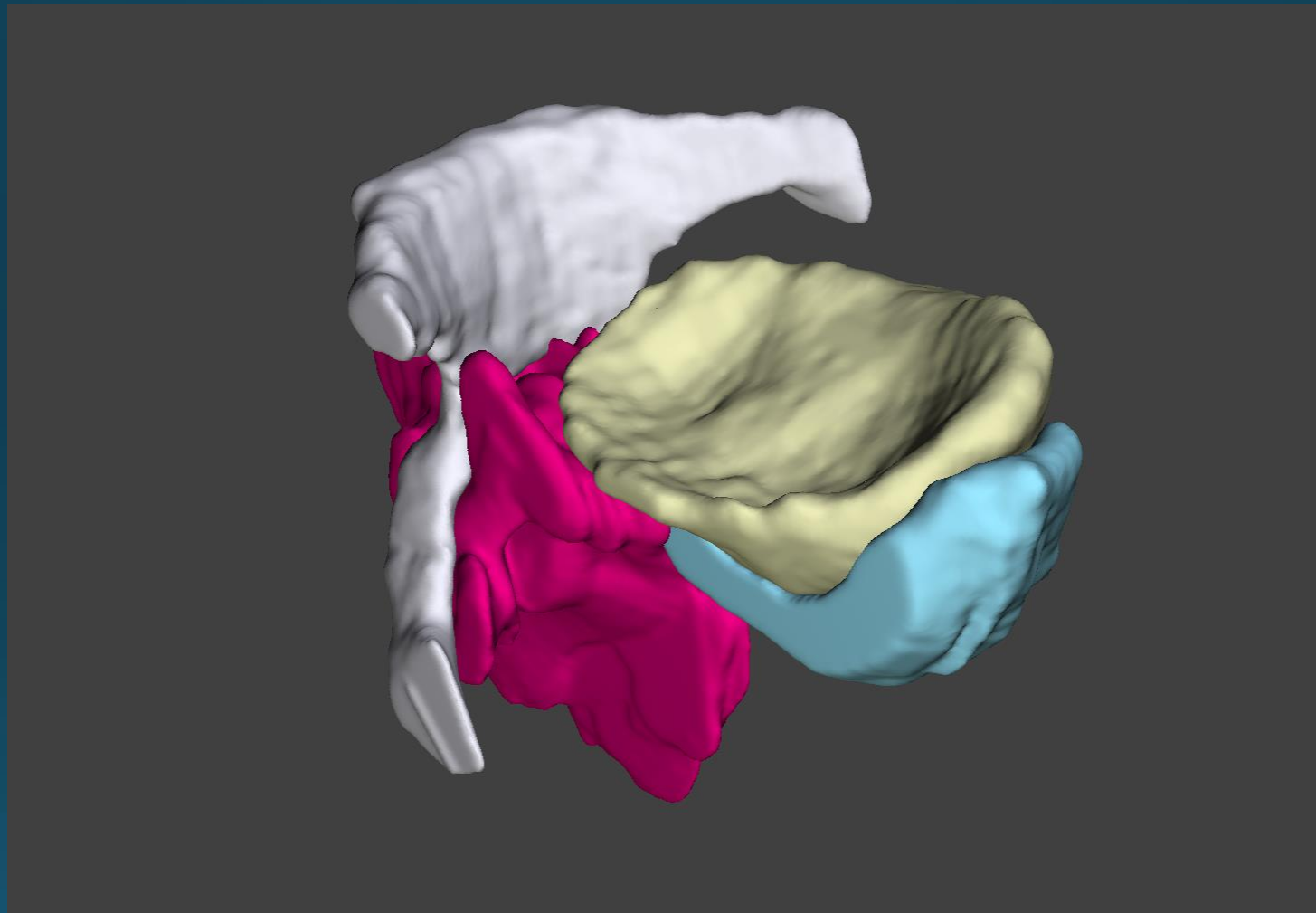
Lines Of Resection Of The Pubic Bone And Labia

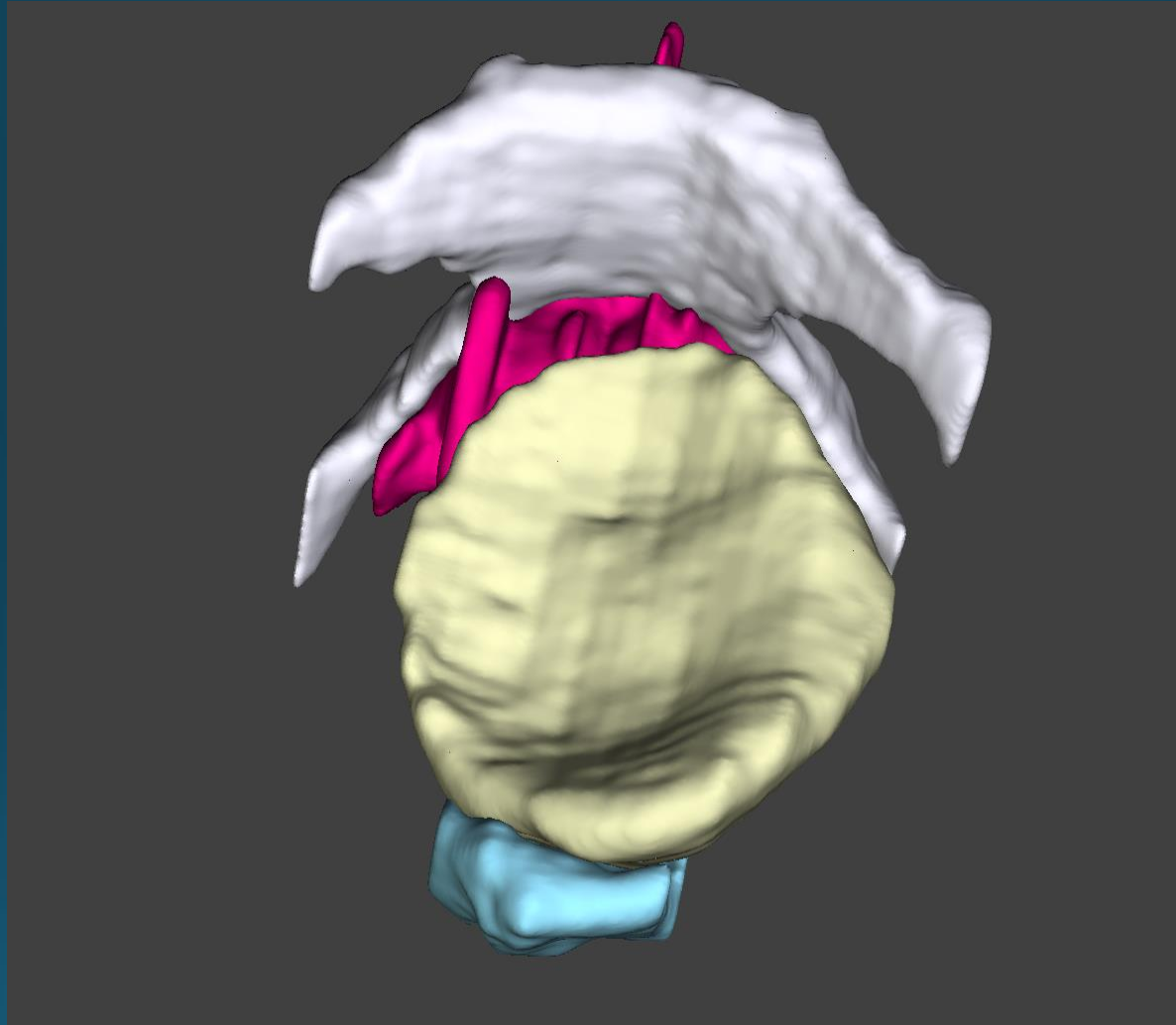


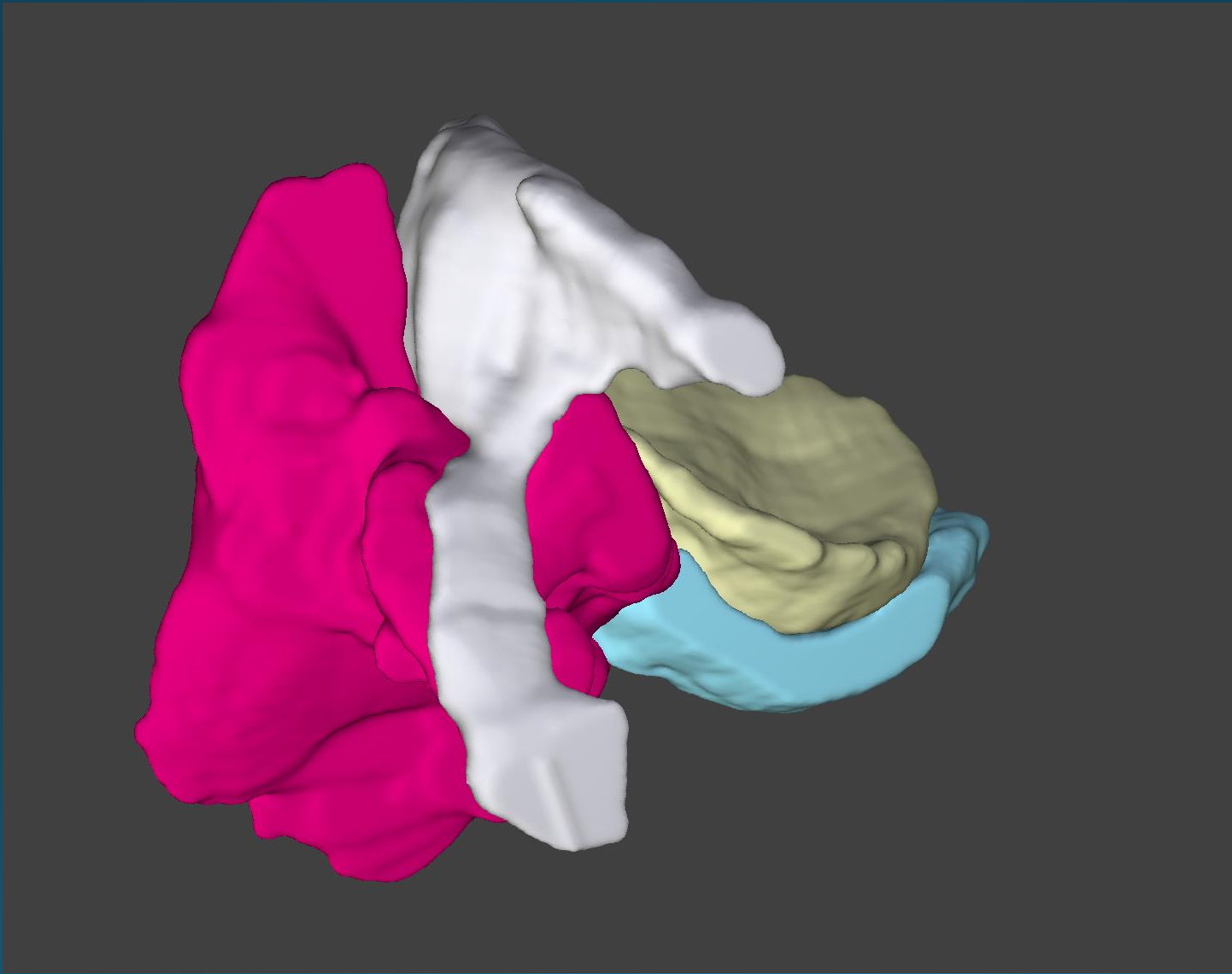
3D Module

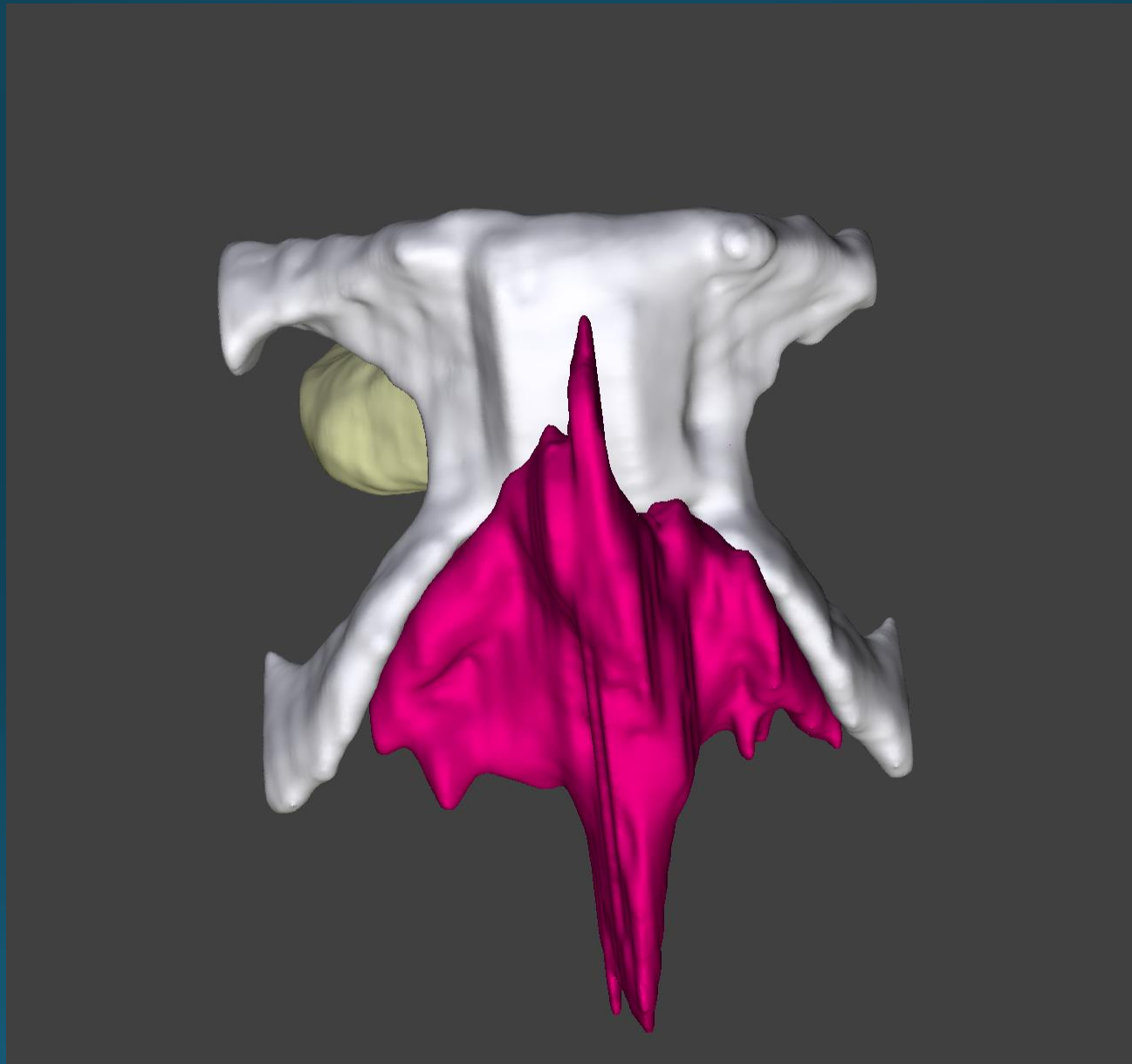










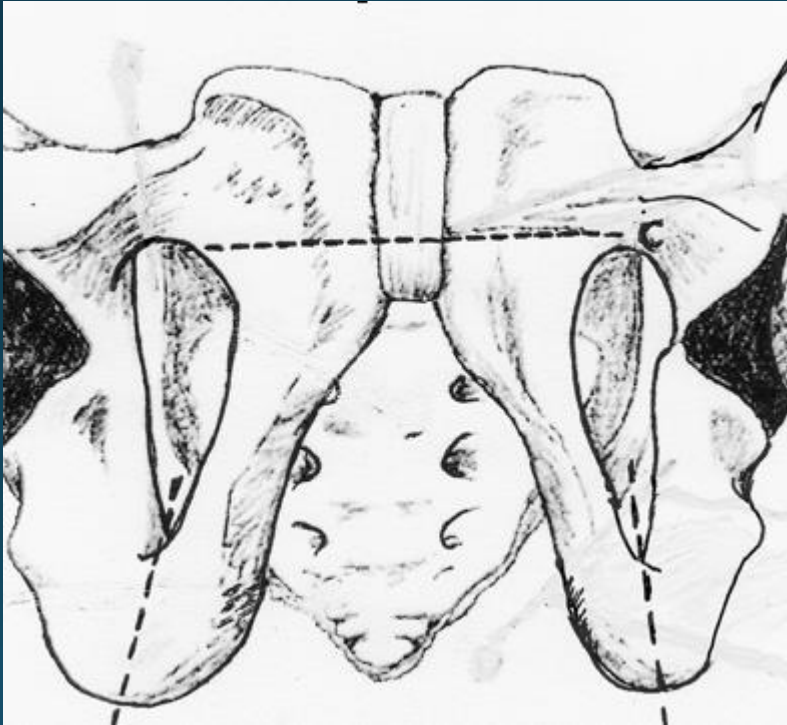


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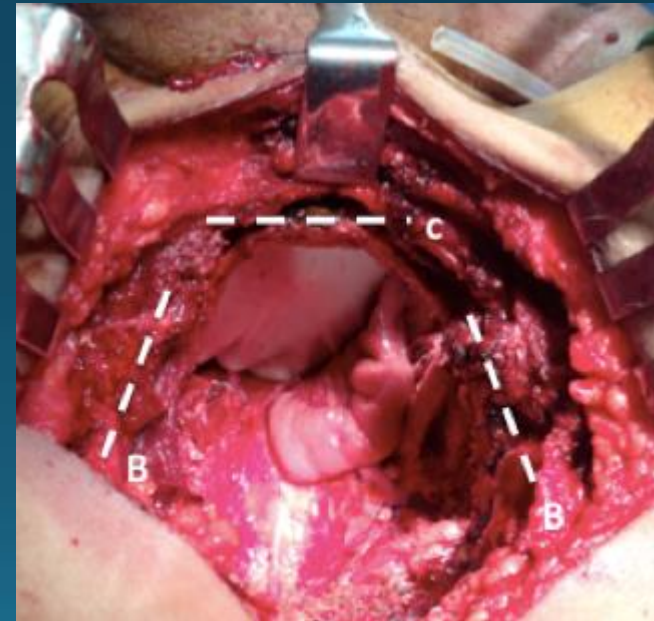
alahmadiraha@gmail.com

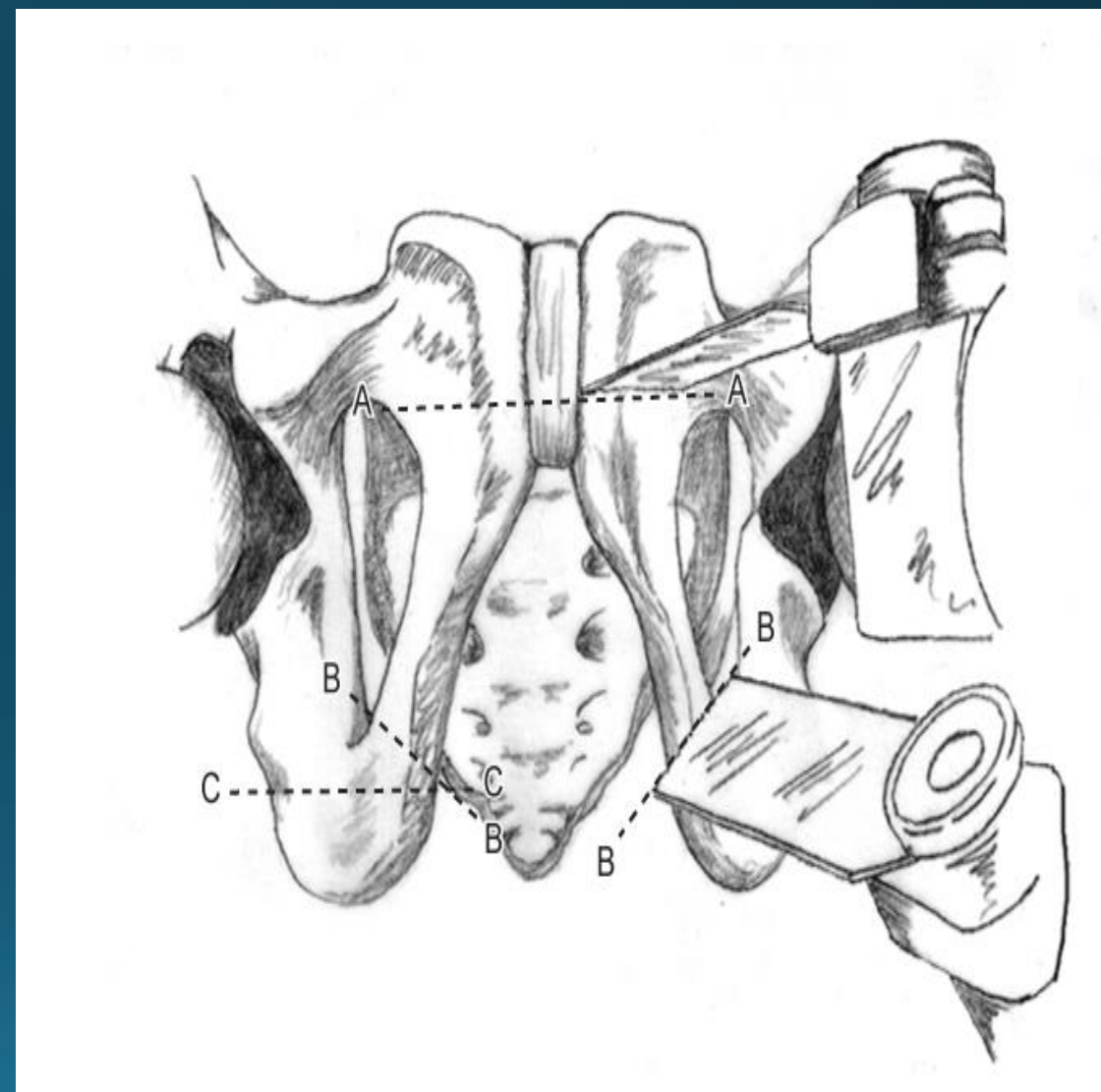
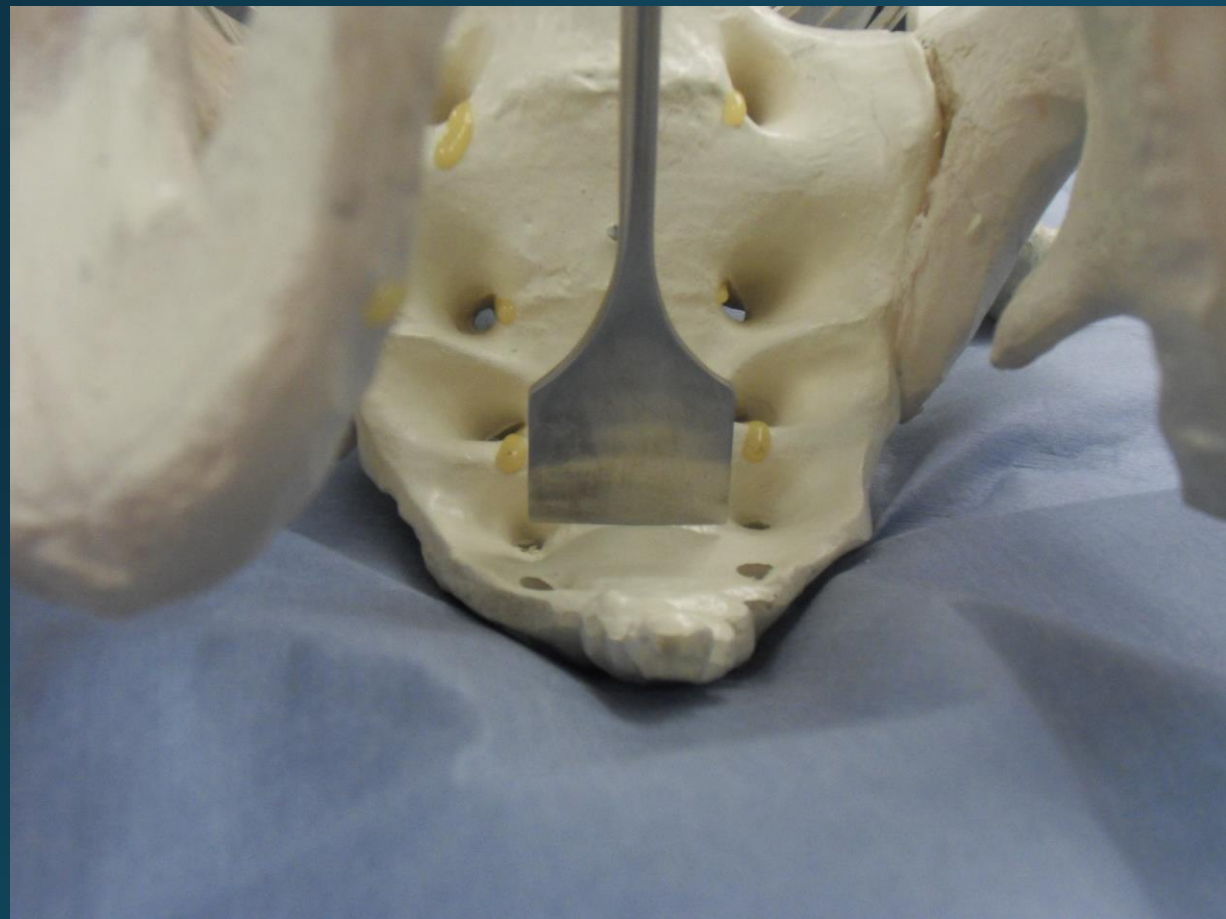
Partial Pubic Bone

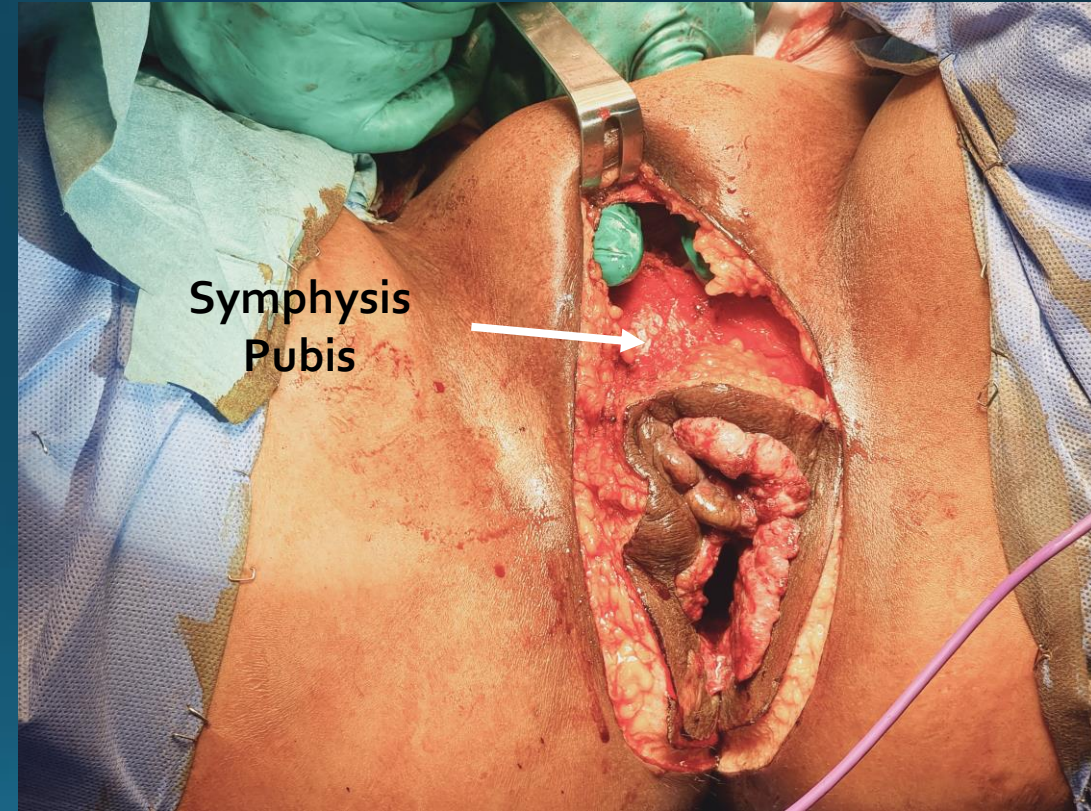
Diagrammatic

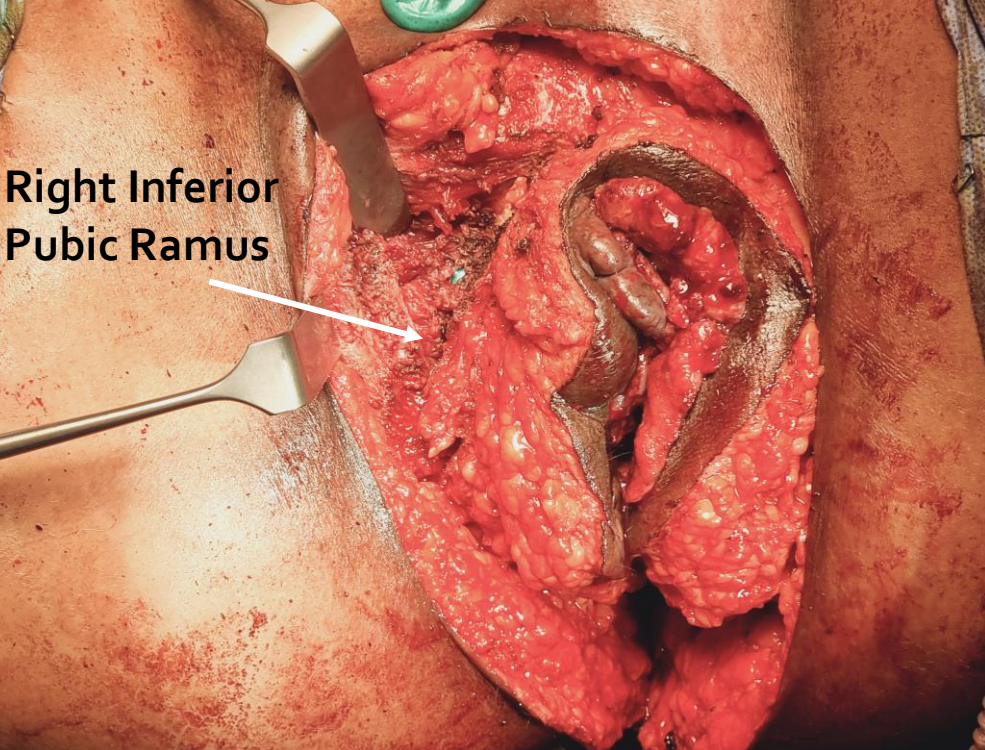


Transection Lines



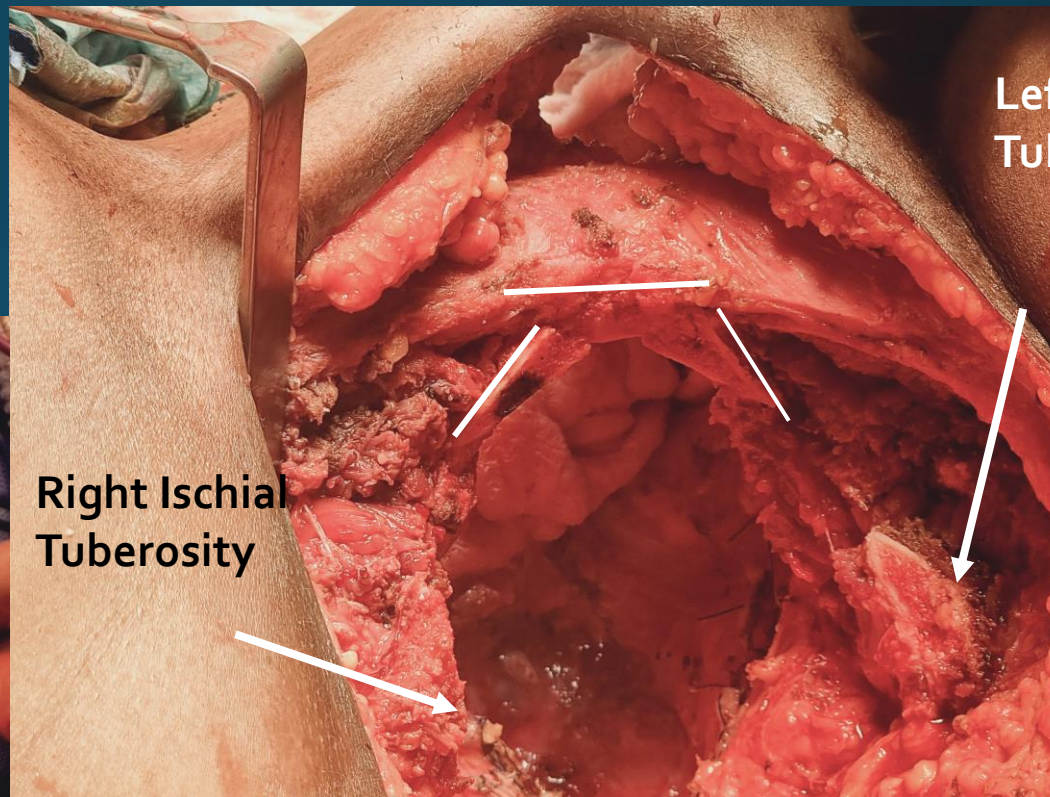
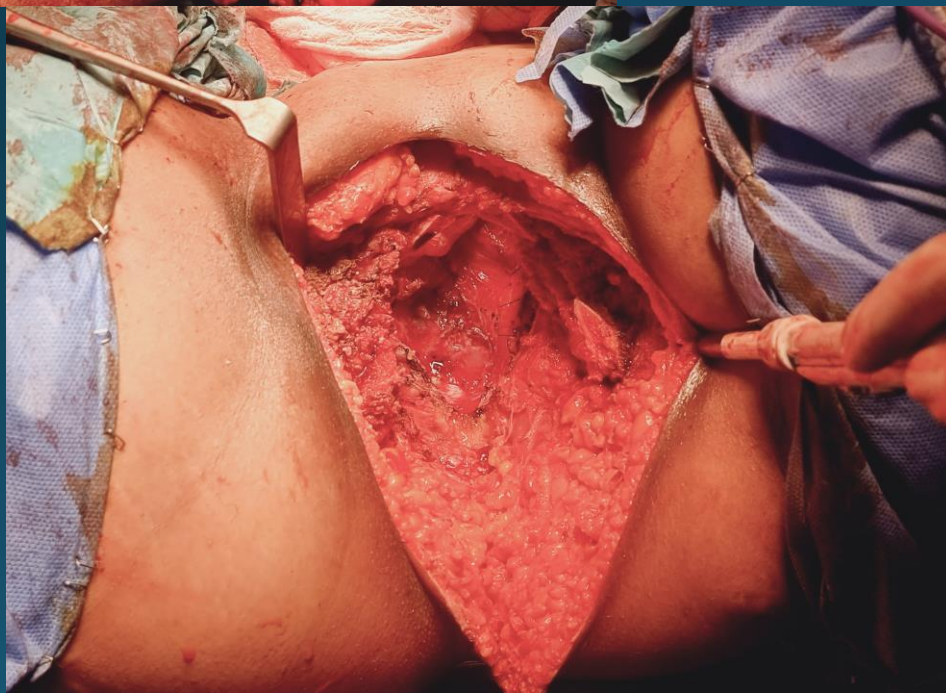






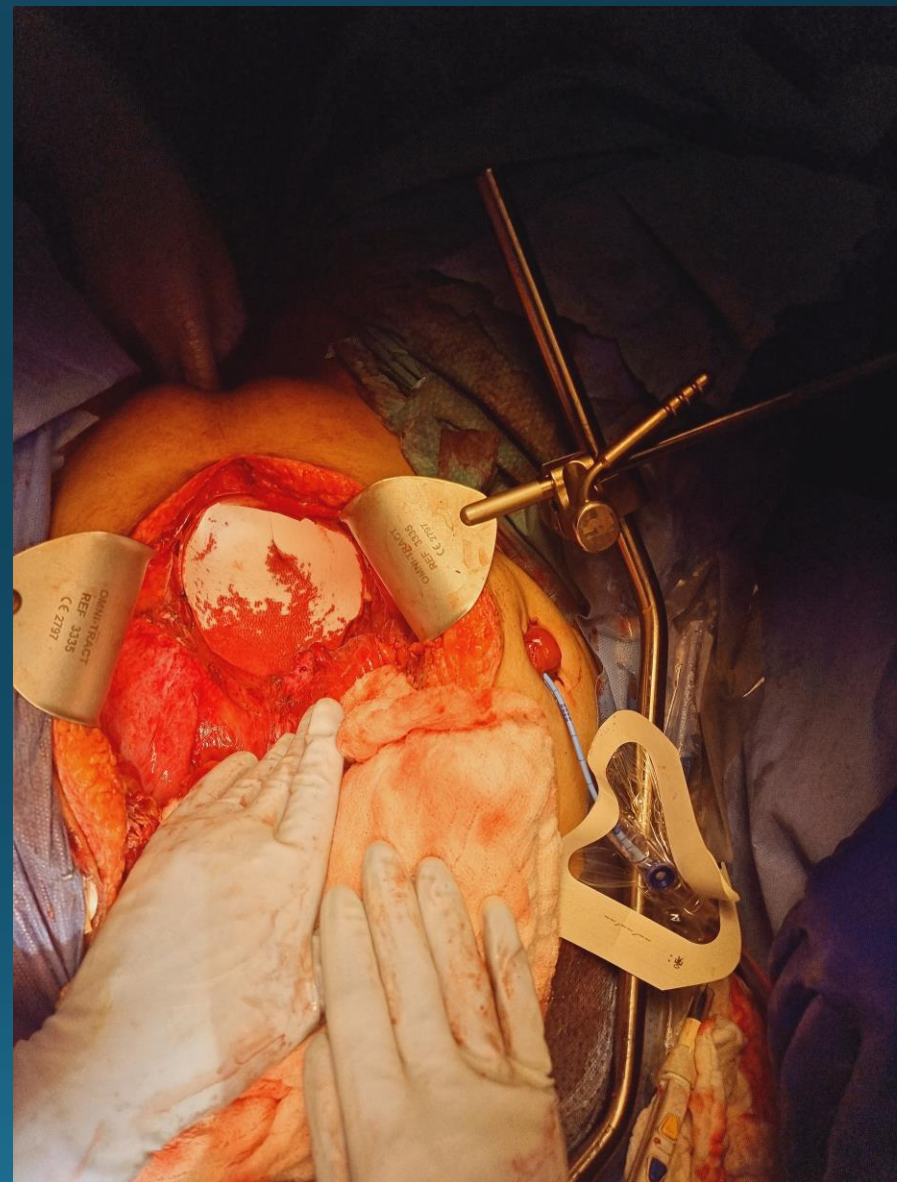
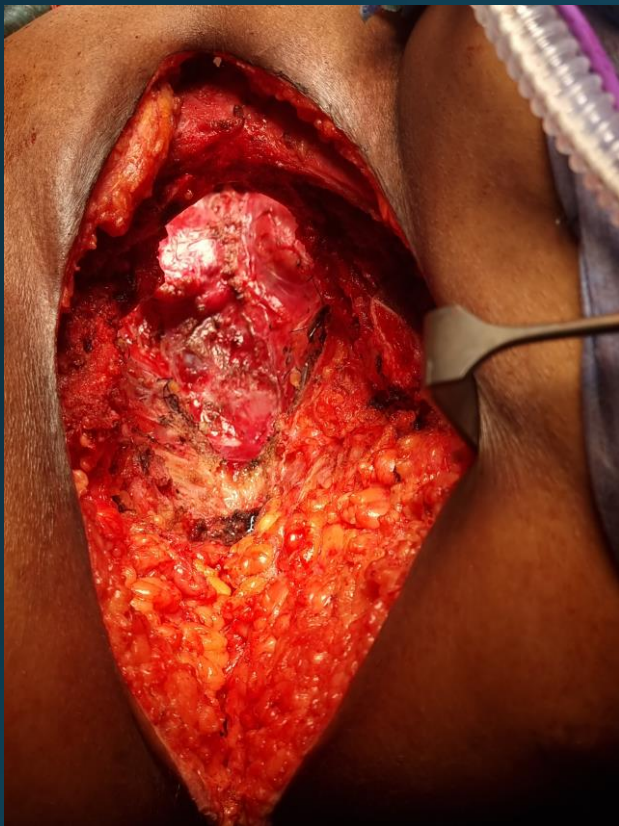
**Right Inferior
Pubic Ramus**

Resection Margin At Symphysis Pubis

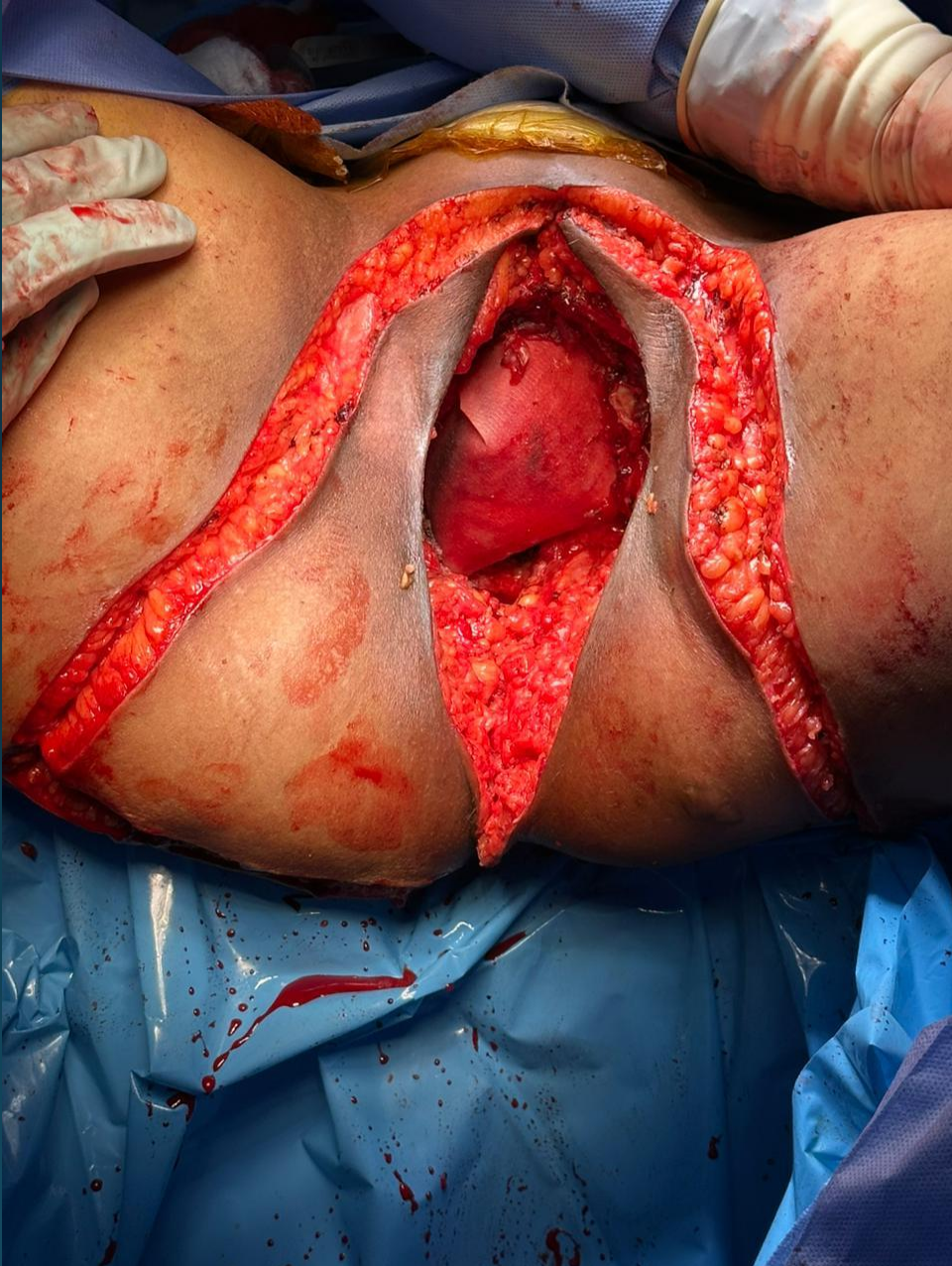


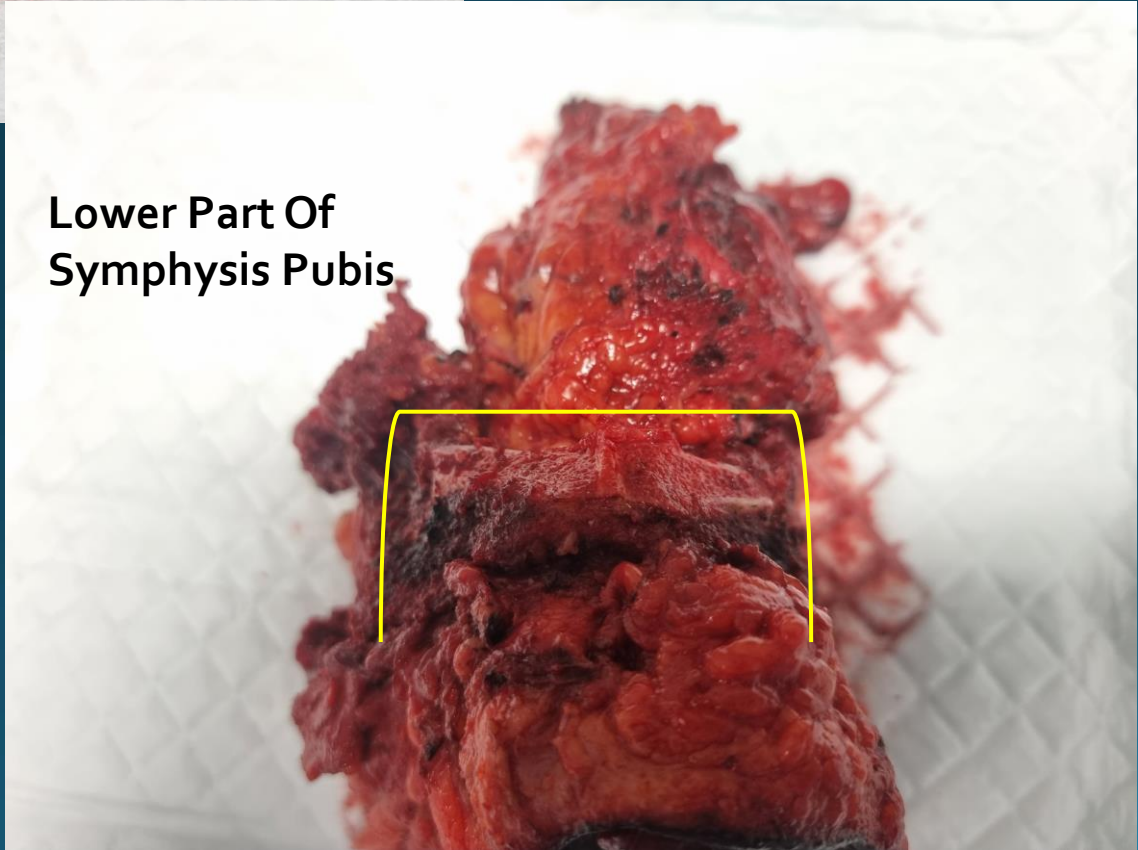
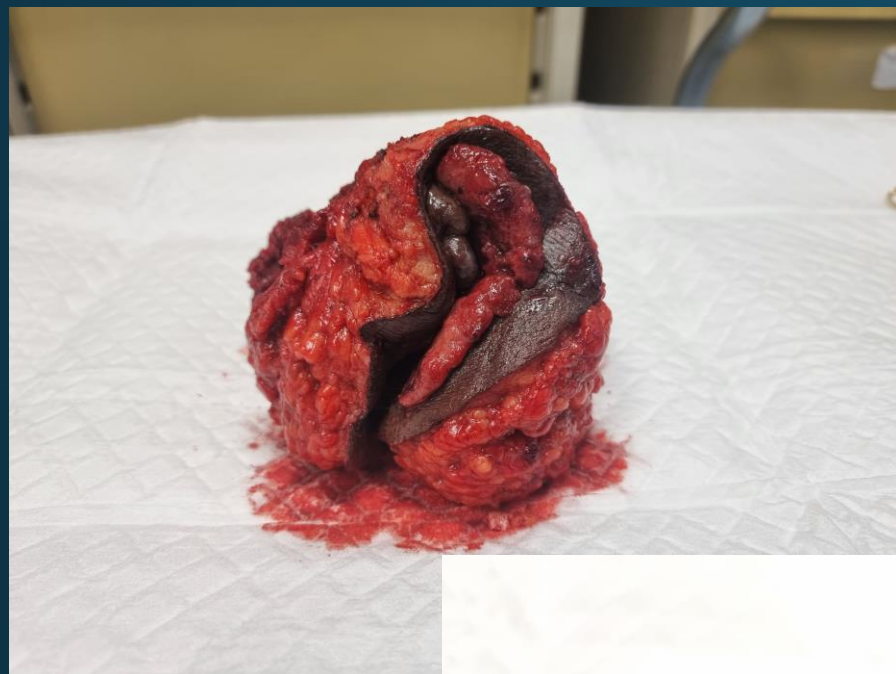
**Left Ischial
Tuberosity**

**Right Ischial
Tuberosity**

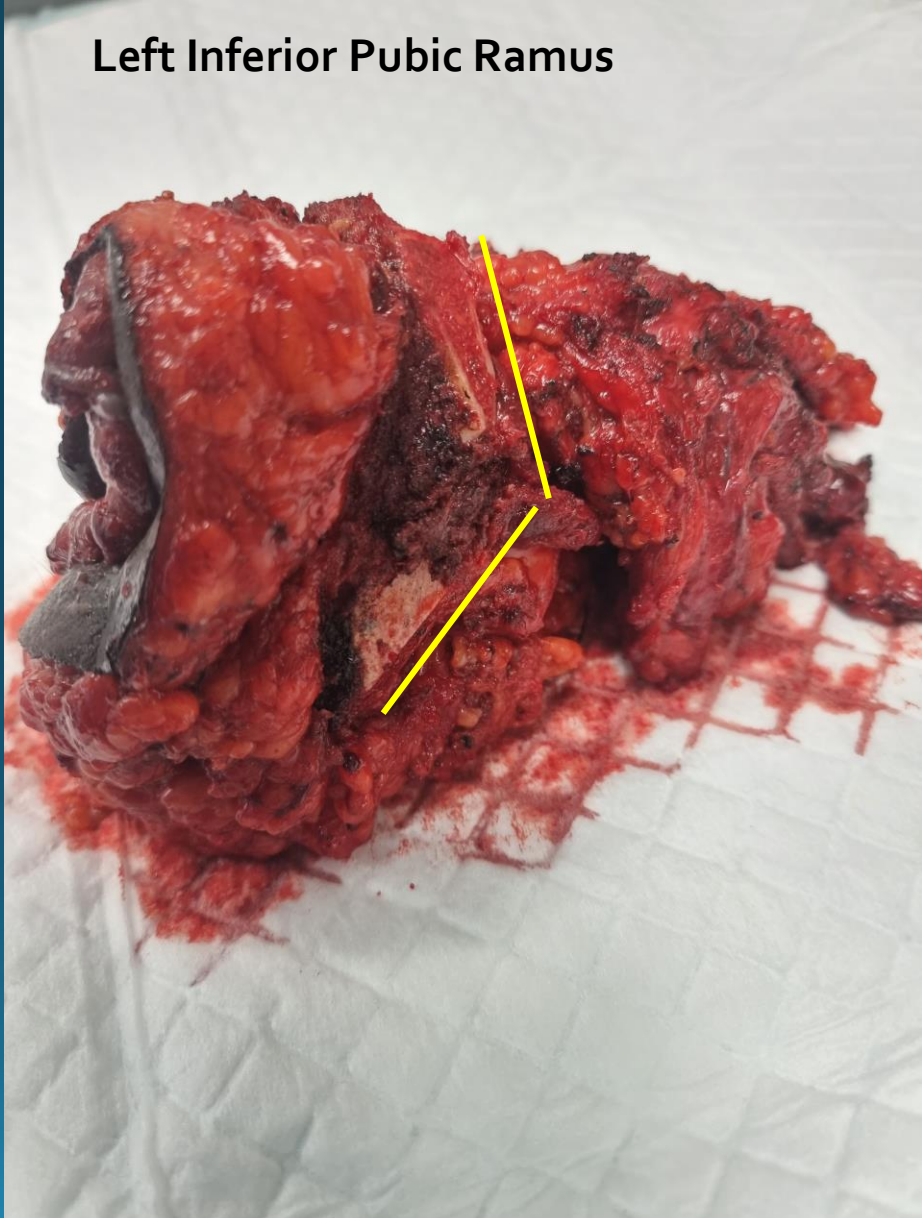


Reconstruction Part

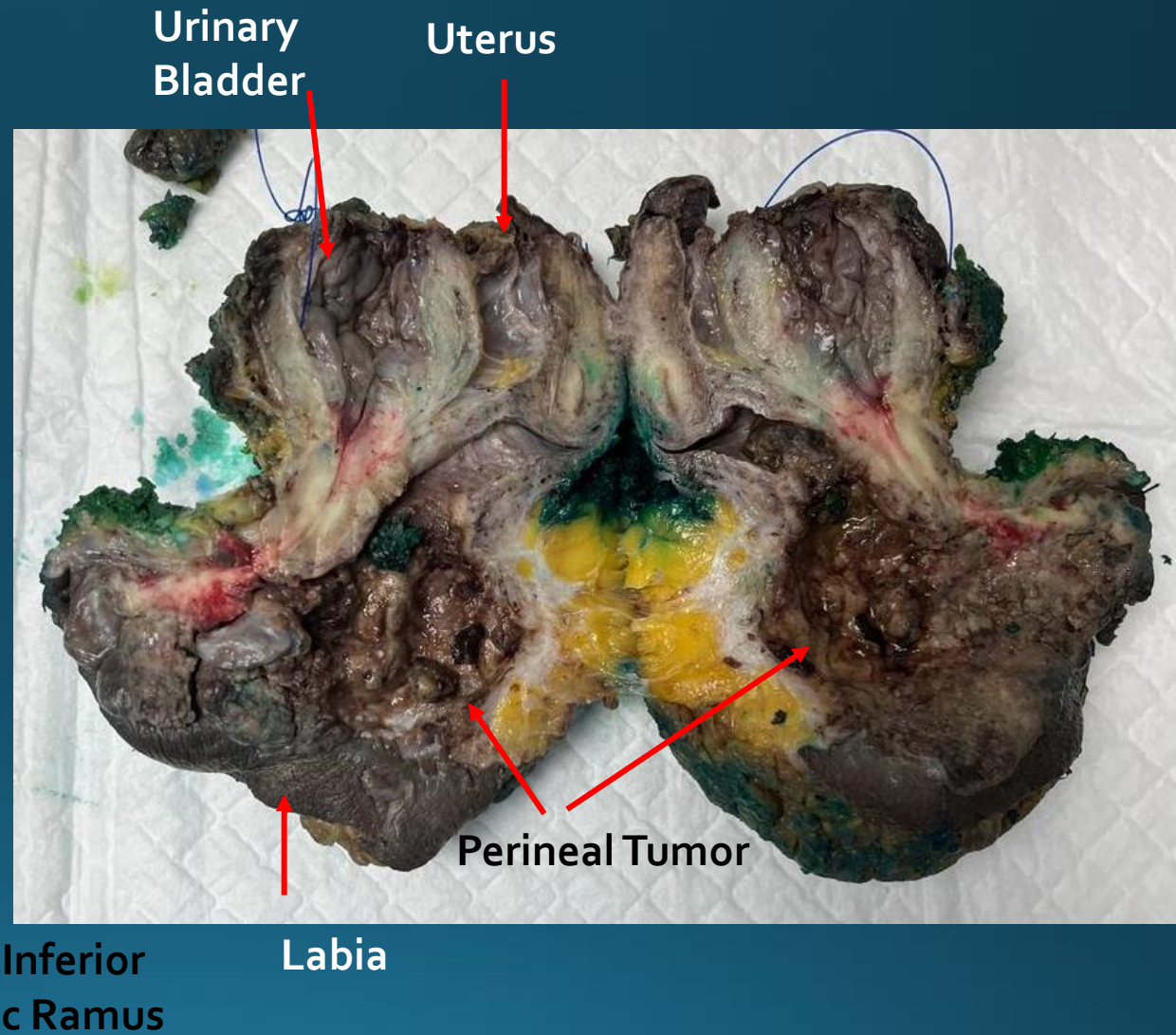
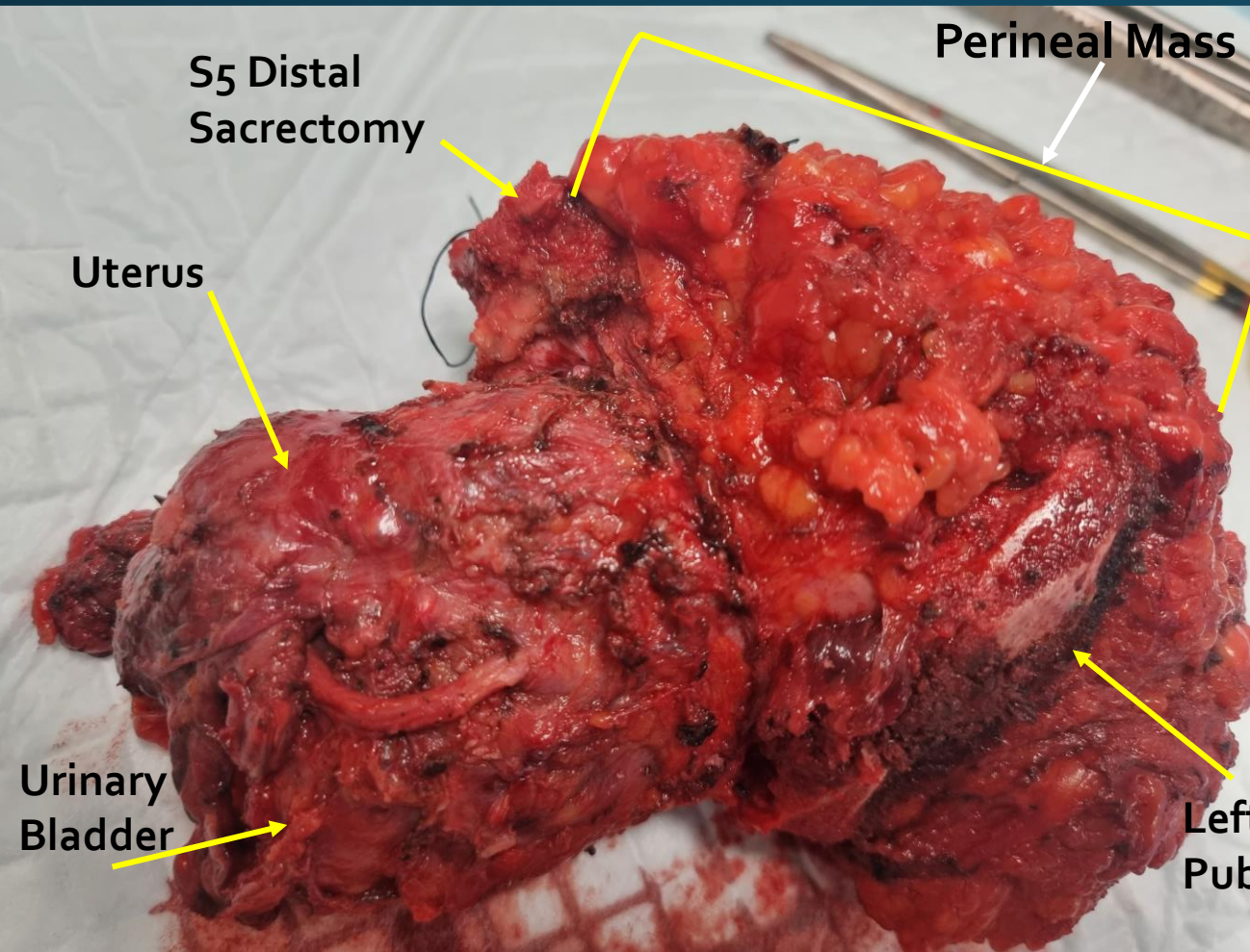


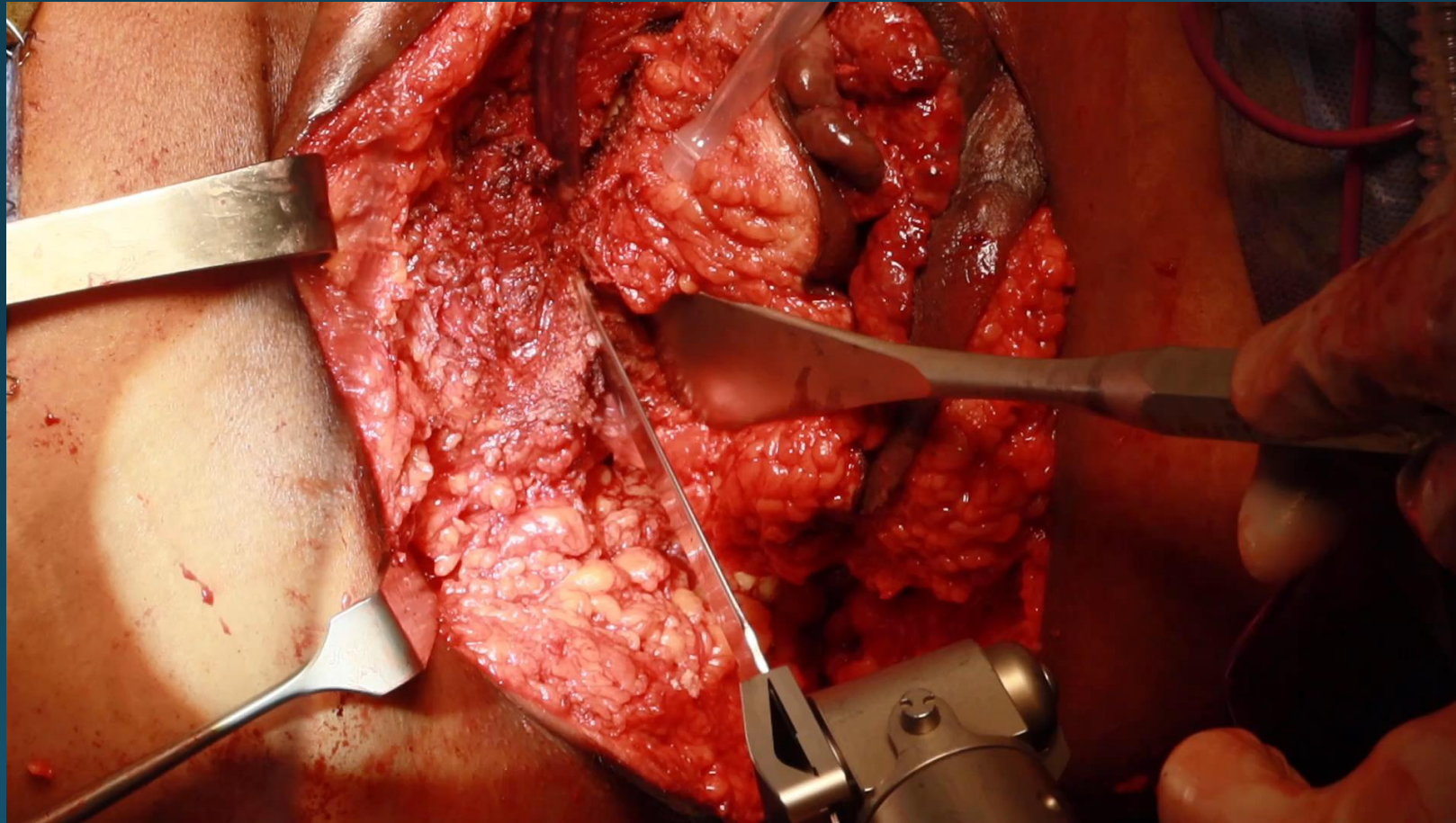


Lower Part Of
Symphysis Pubis



Left Inferior Pubic Ramus





Raha Alahmadi

alahmadiraha@gmail.com



Case 2



Lines of Resection

Raha Alahmadi alahmadiraha@gmail.com

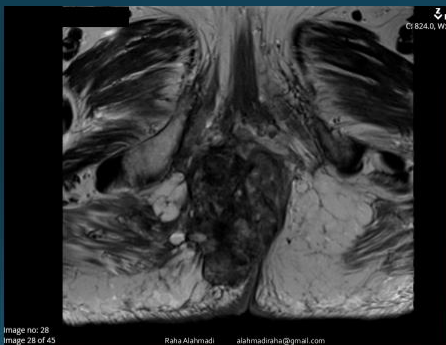
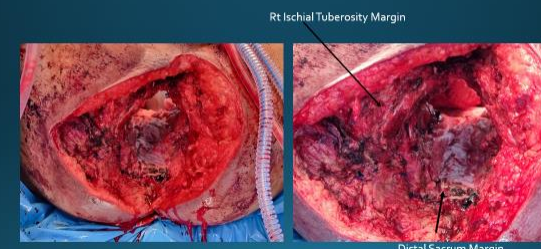


Image No: 28
Image 28 of 45

Raha Alahmadi alahmadiraha@gmail.com



Raha Alahmadi alahmadiraha@gmail.com



Raha Alahmadi alahmadiraha@gmail.com



Raha Alahmadi alahmadiraha@gmail.com



Raha Alahmadi alahmadiraha@gmail.com

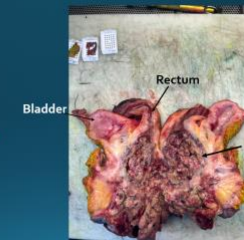


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Rt Ischial Tuberosity cortex

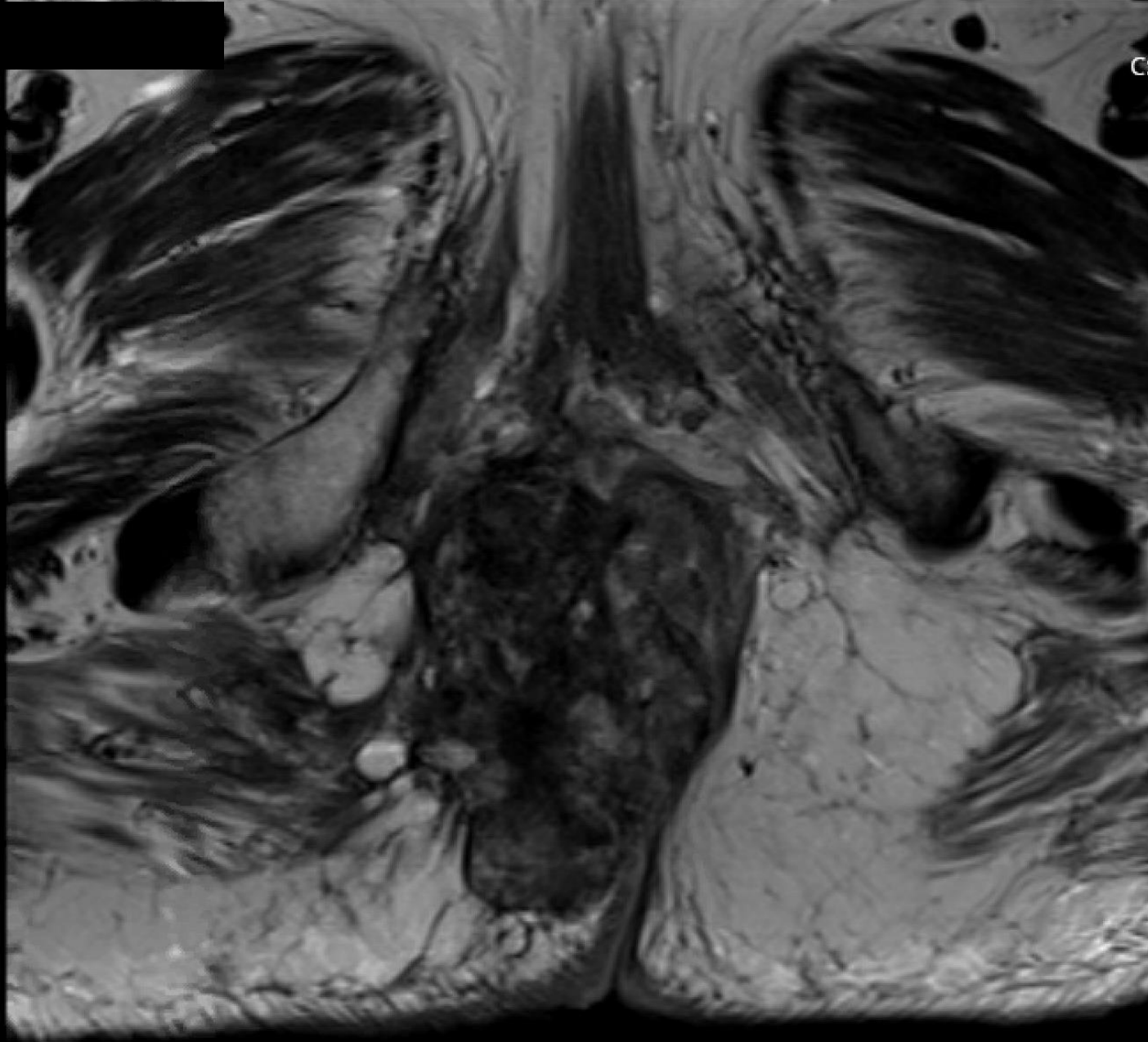
Pathology Specimen



Raha Alahmadi alahmadiraha@gmail.com



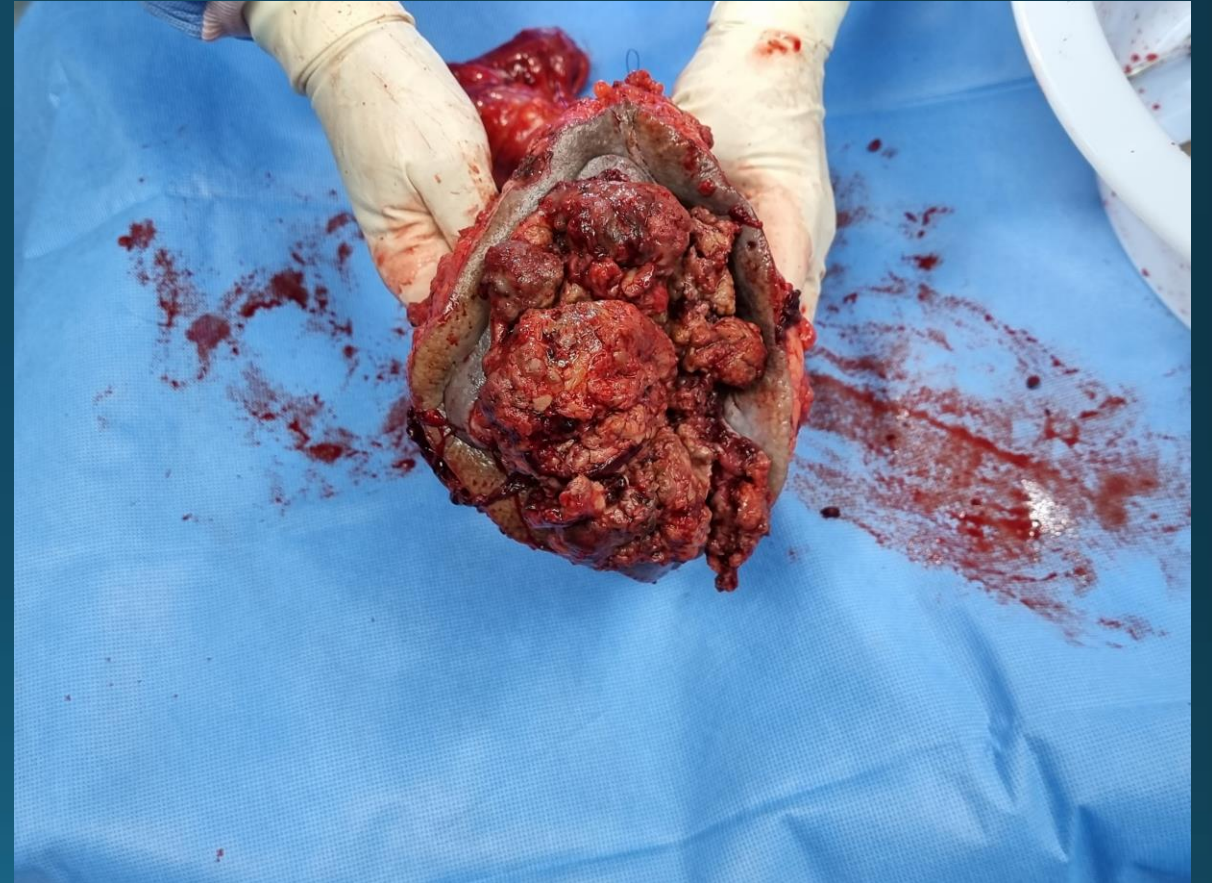
Lines of Resection



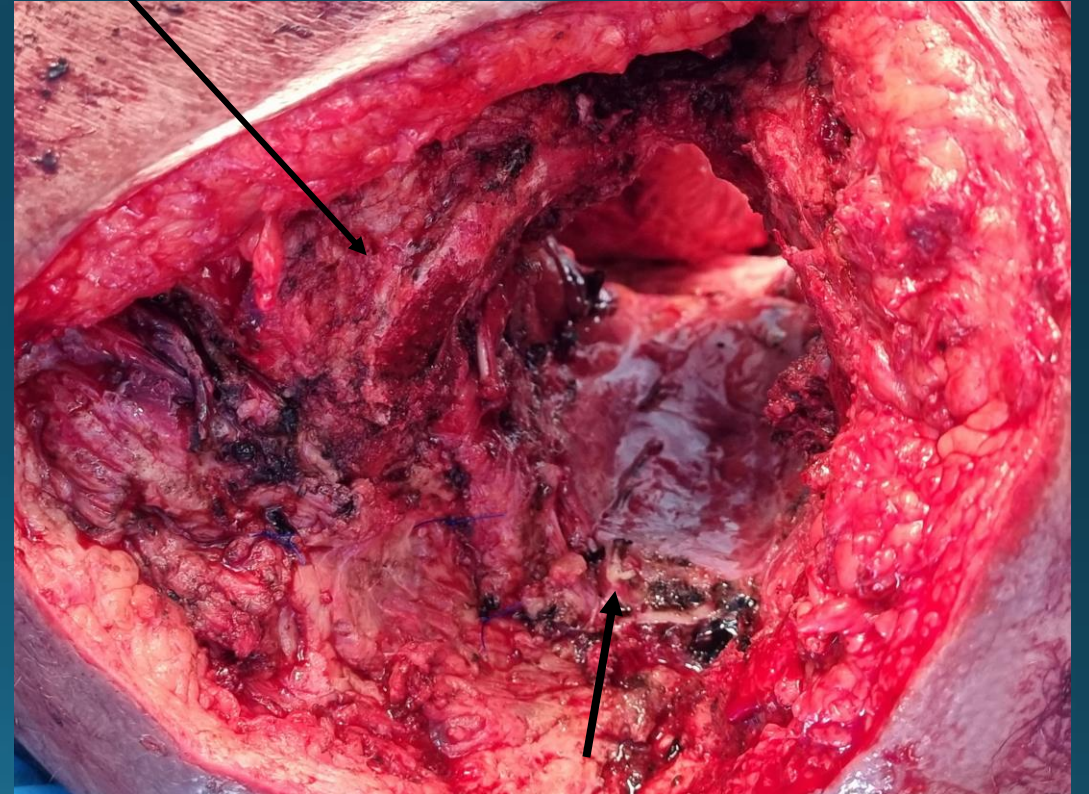
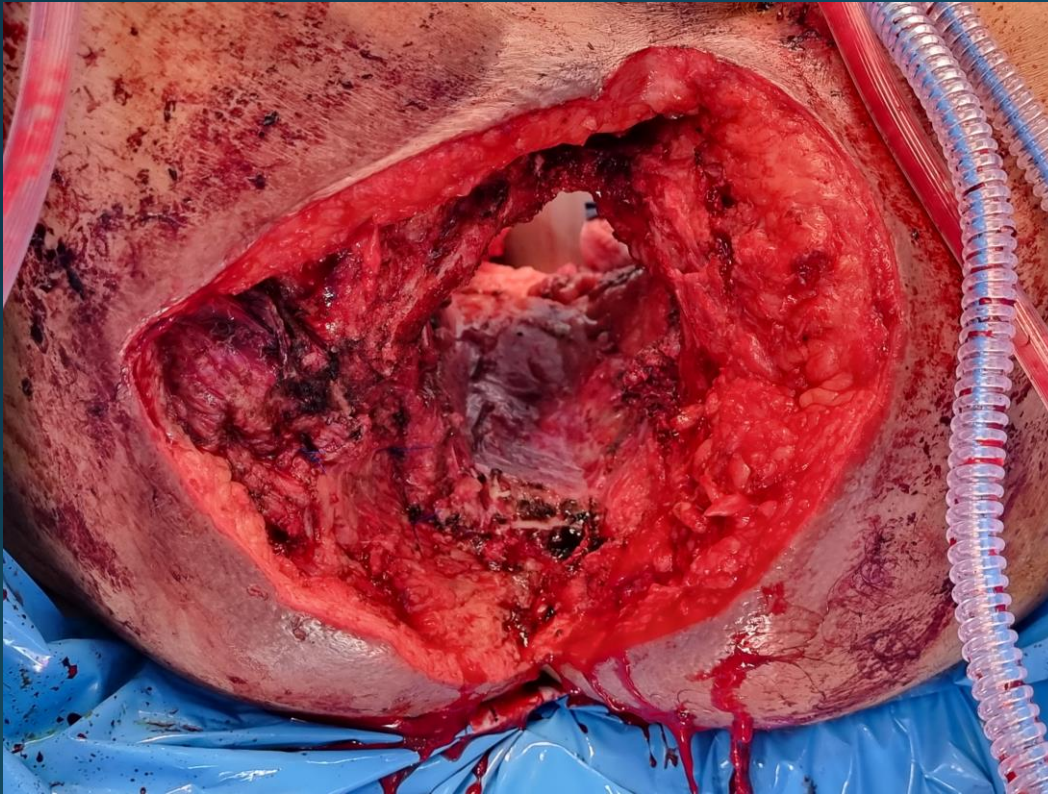
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Image no: 28
Image 28 of 45

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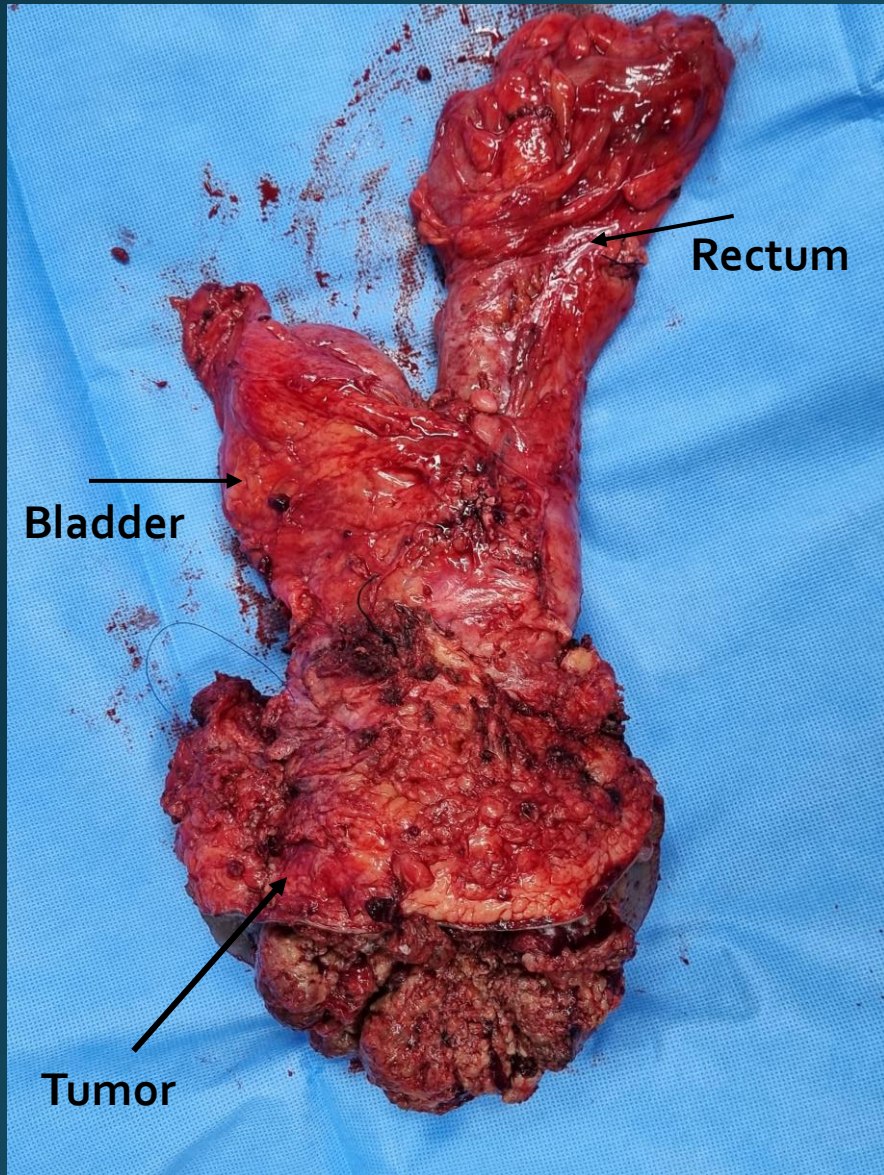
Rt Ischial Tuberosity Margin



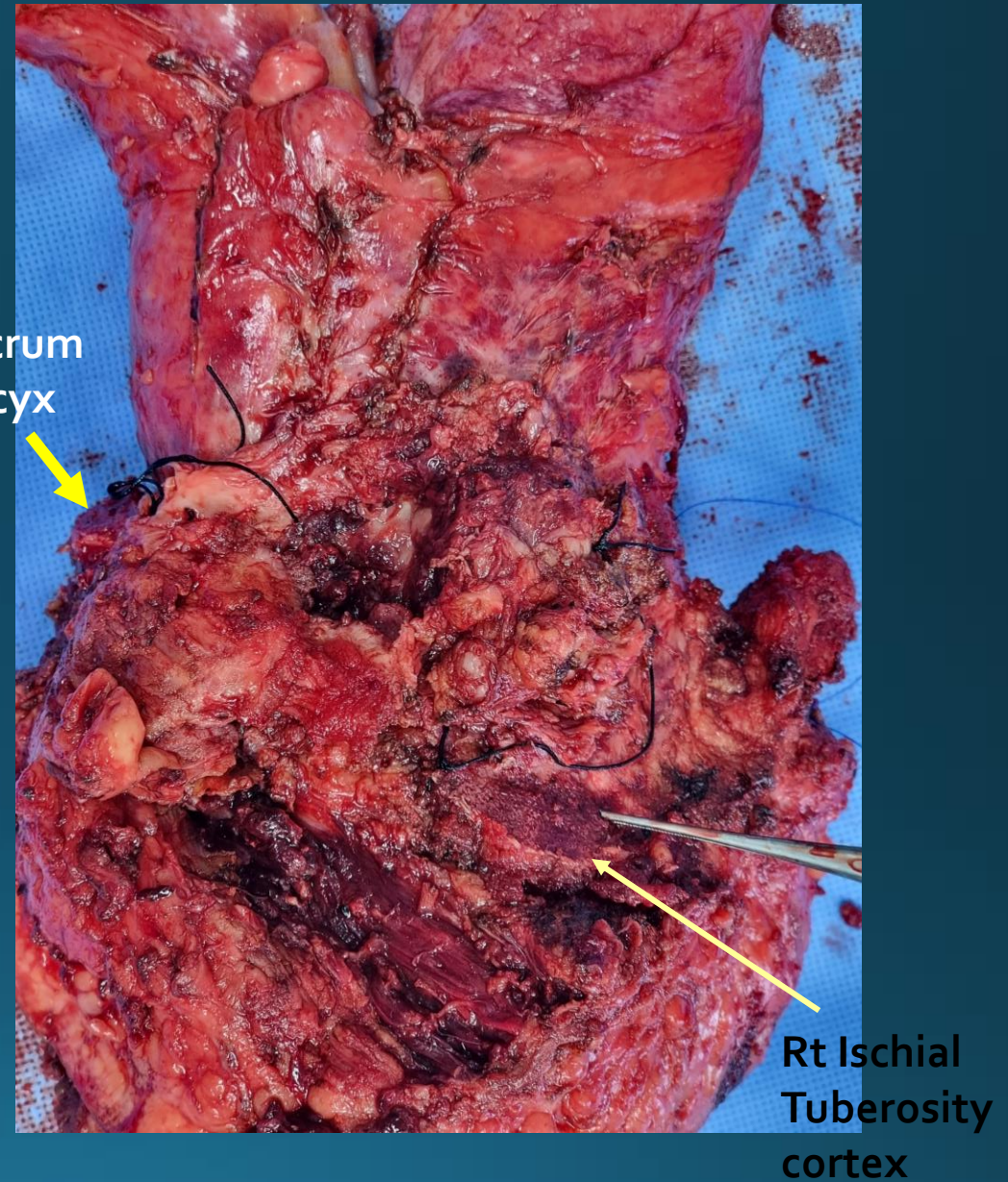
Distal Sacrum Margin



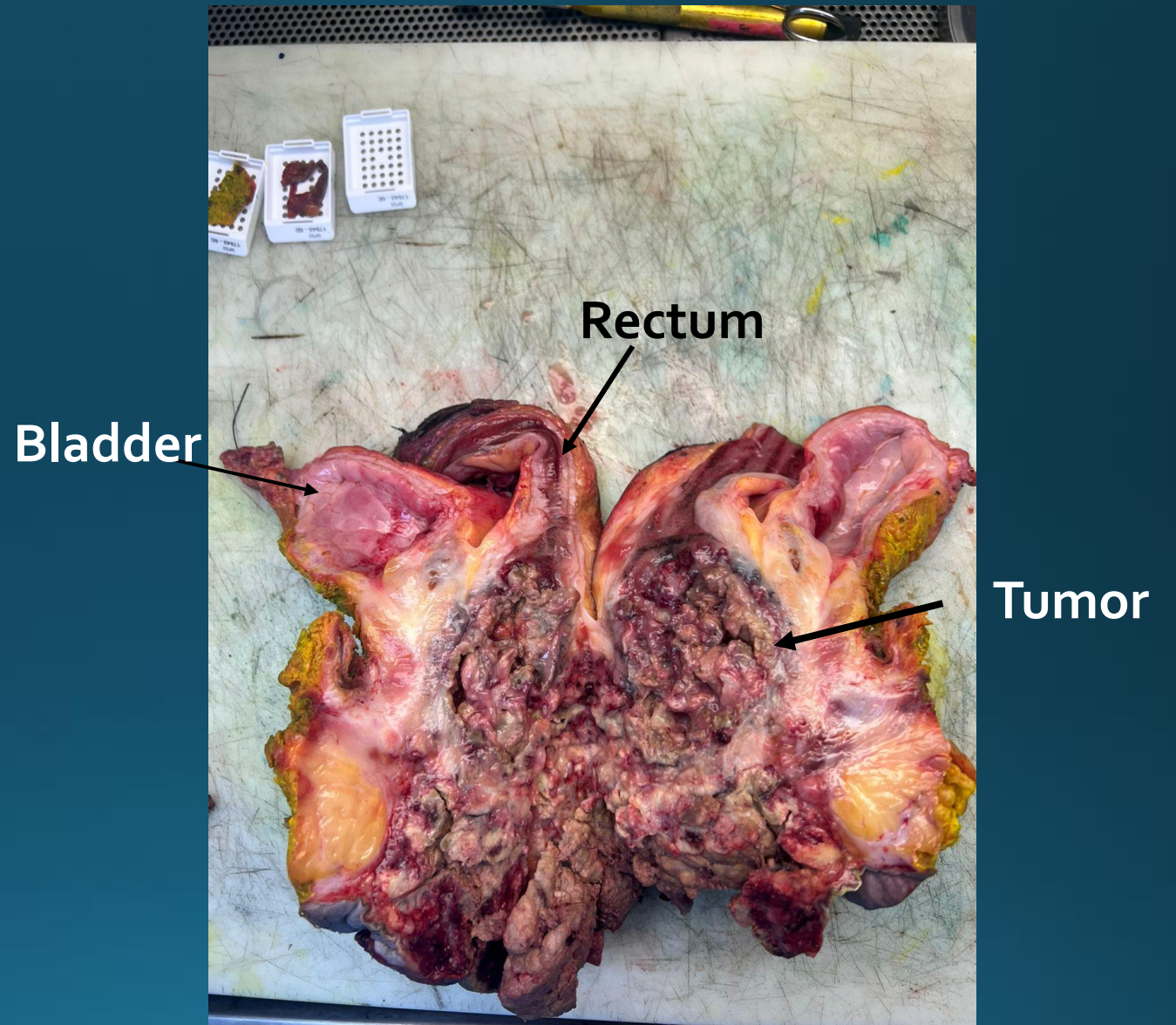


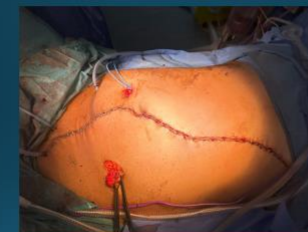
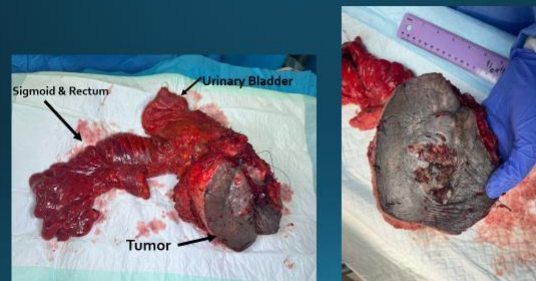
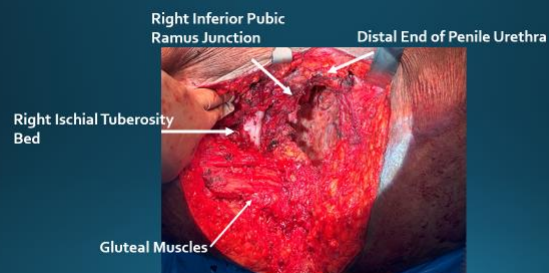
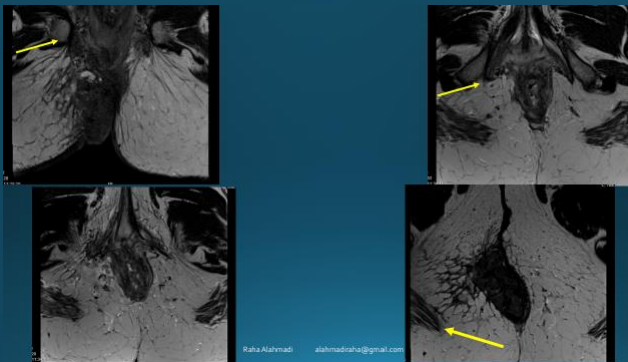
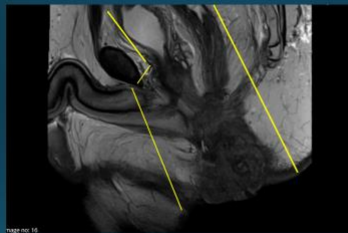


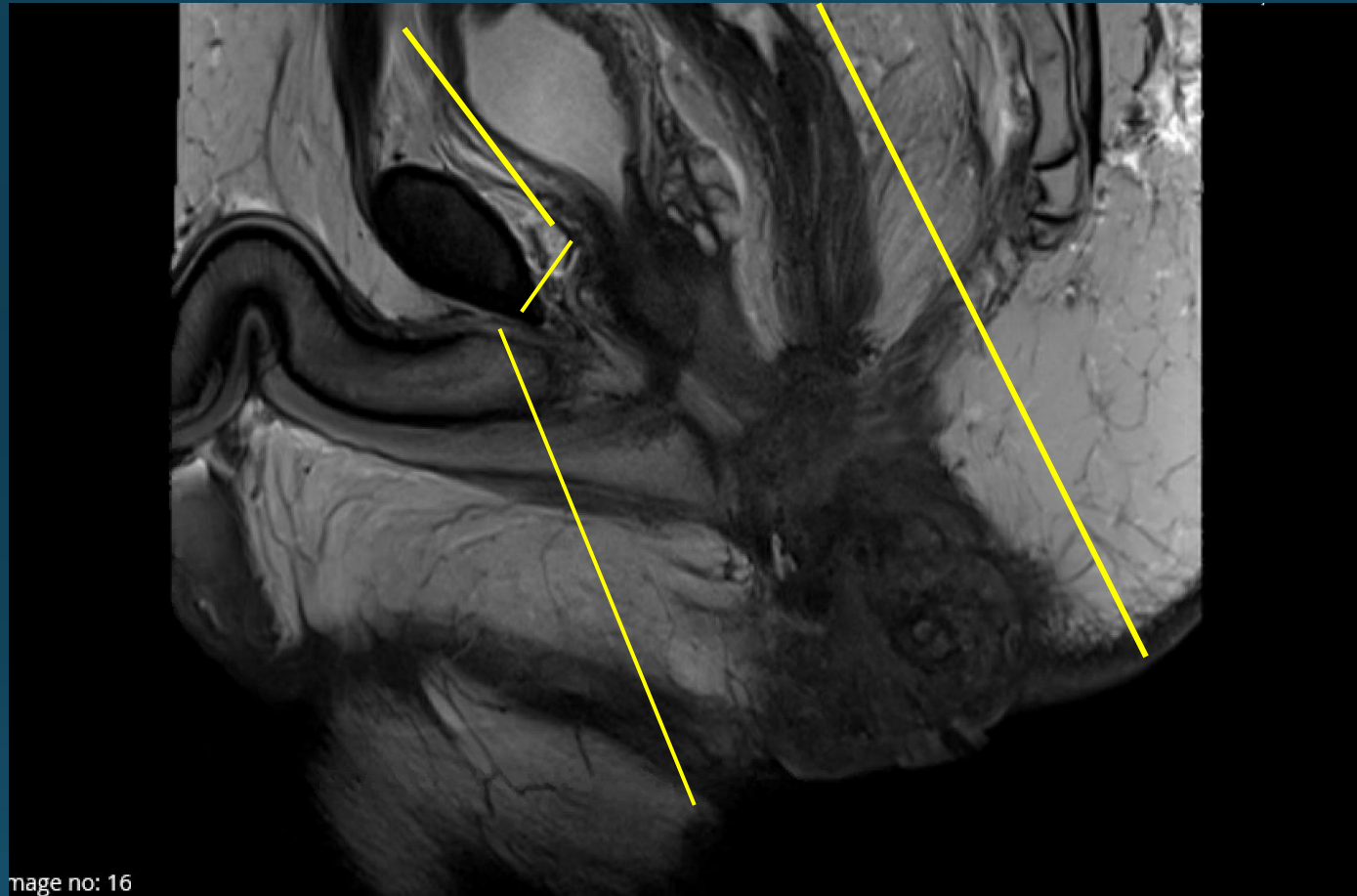
Distal sacrum
S5, Coccyx



Pathology Specimen



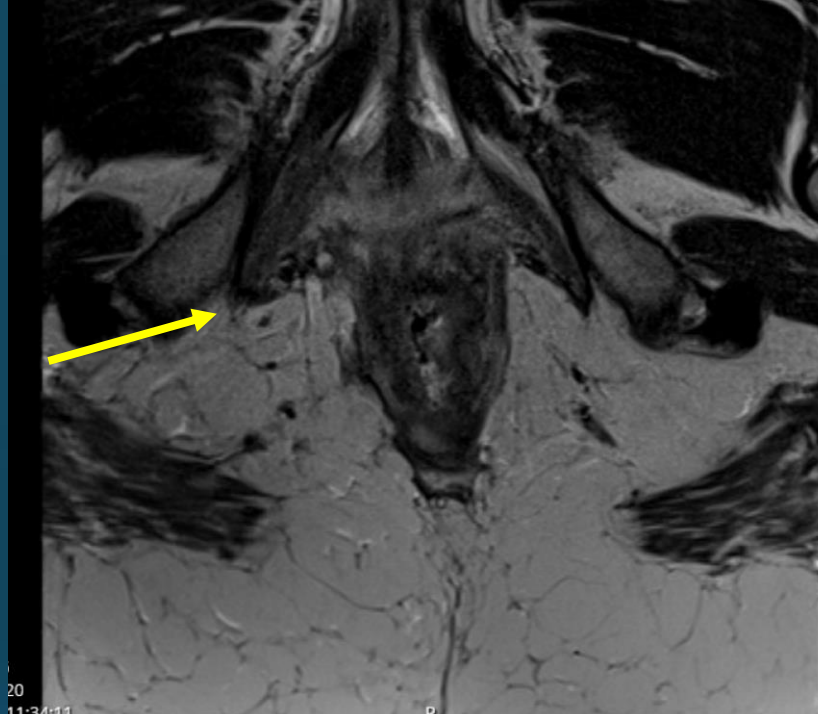






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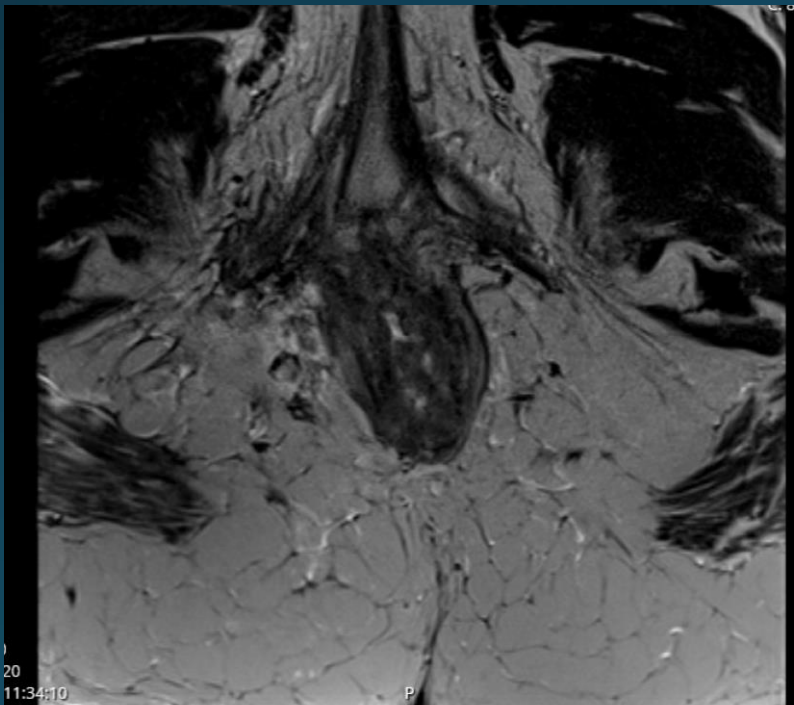


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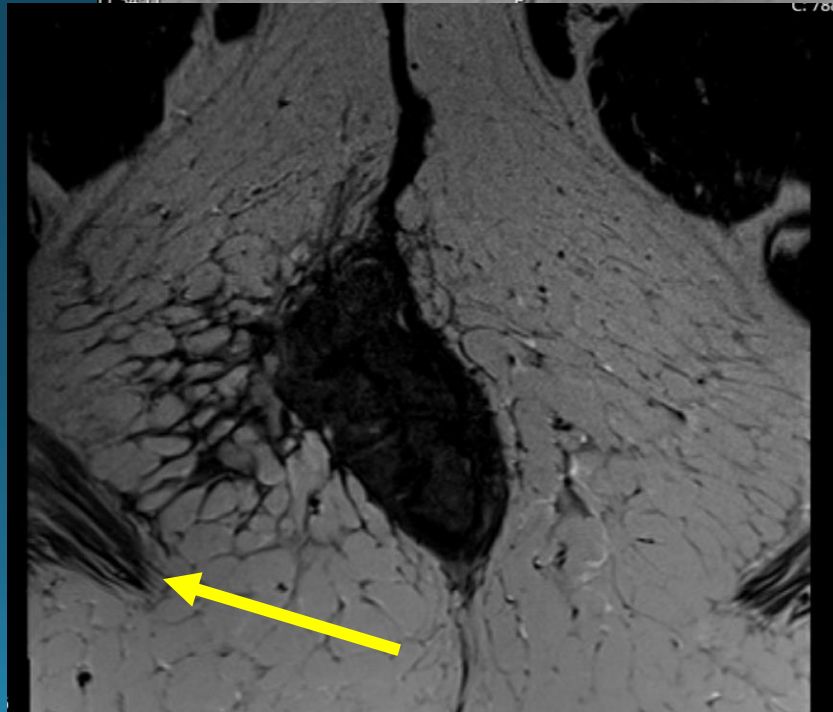
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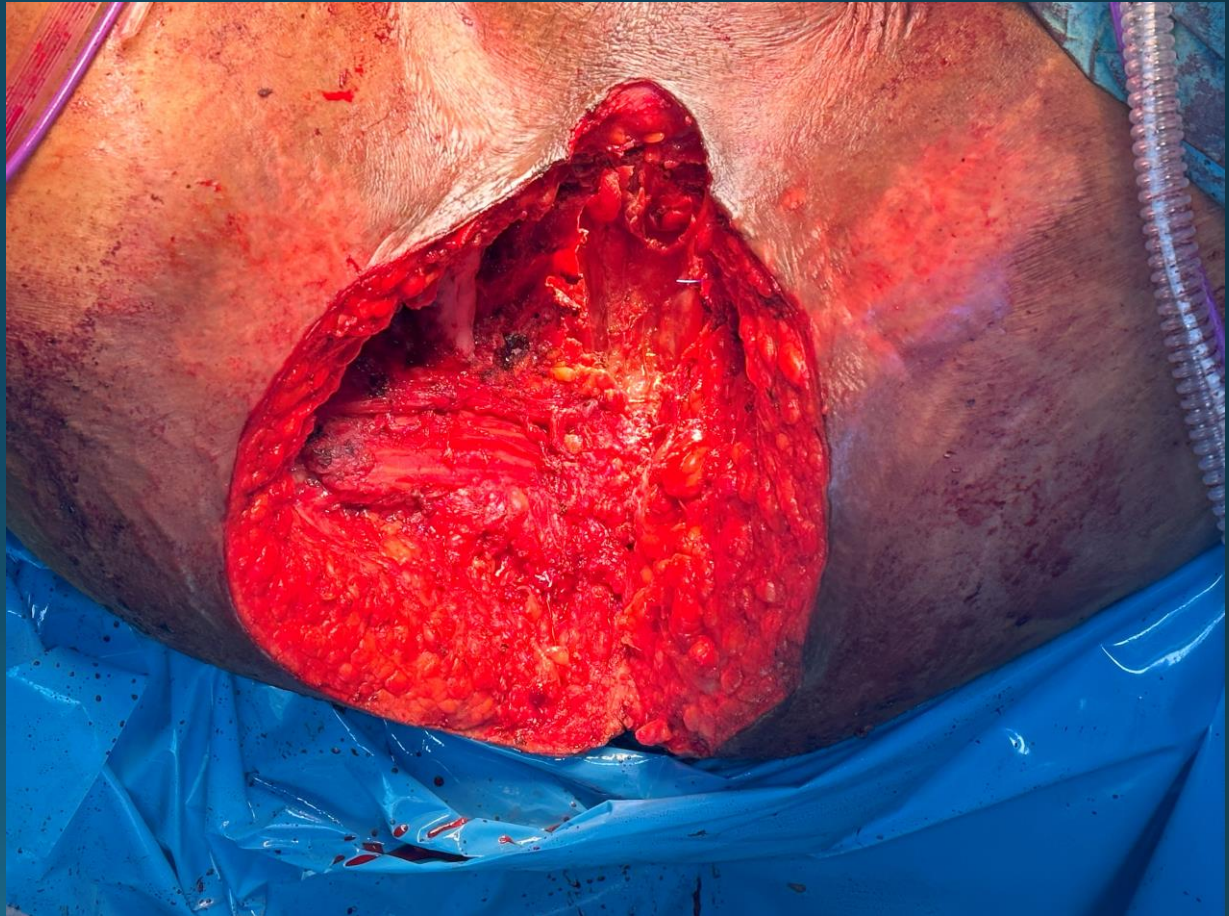
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Raha Alahmadi

alahmadiraha@gmail.com

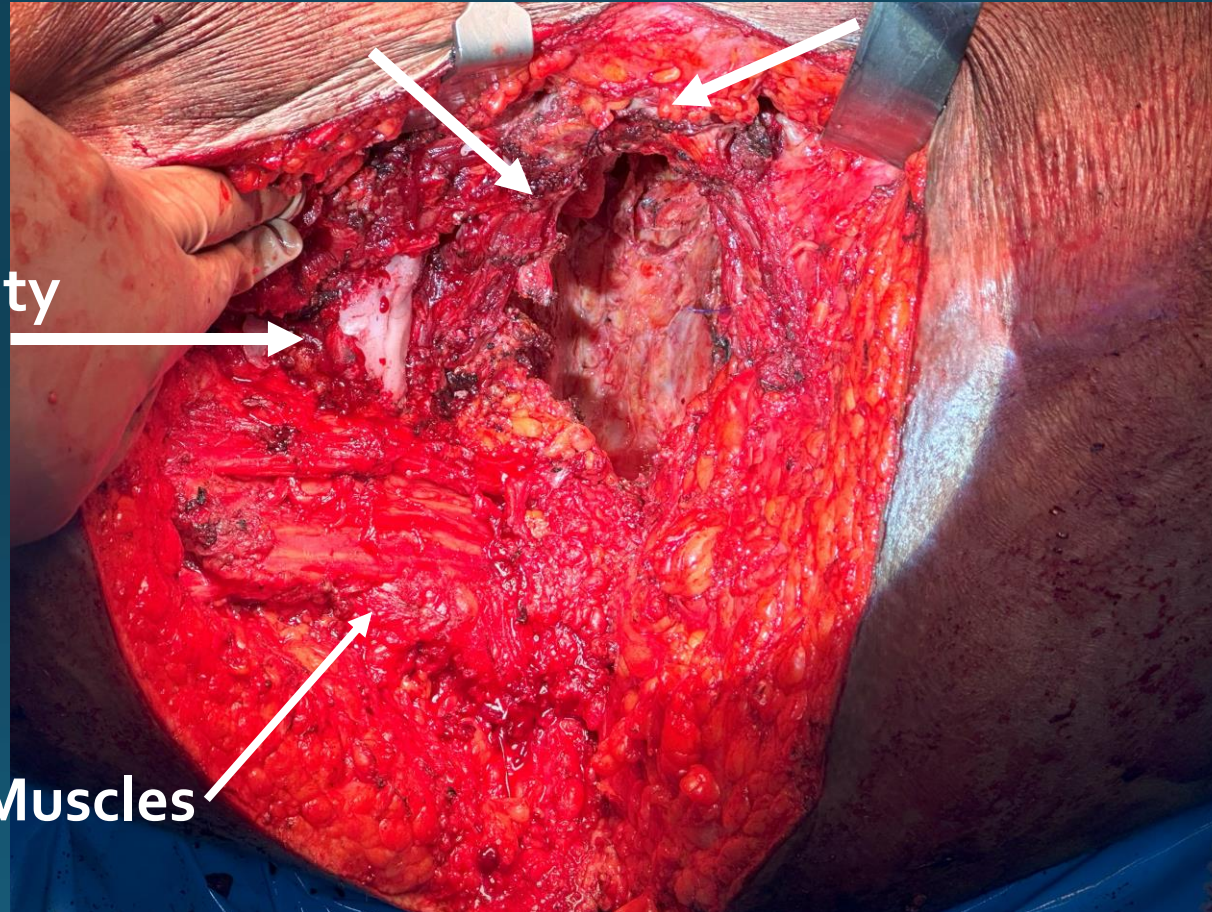


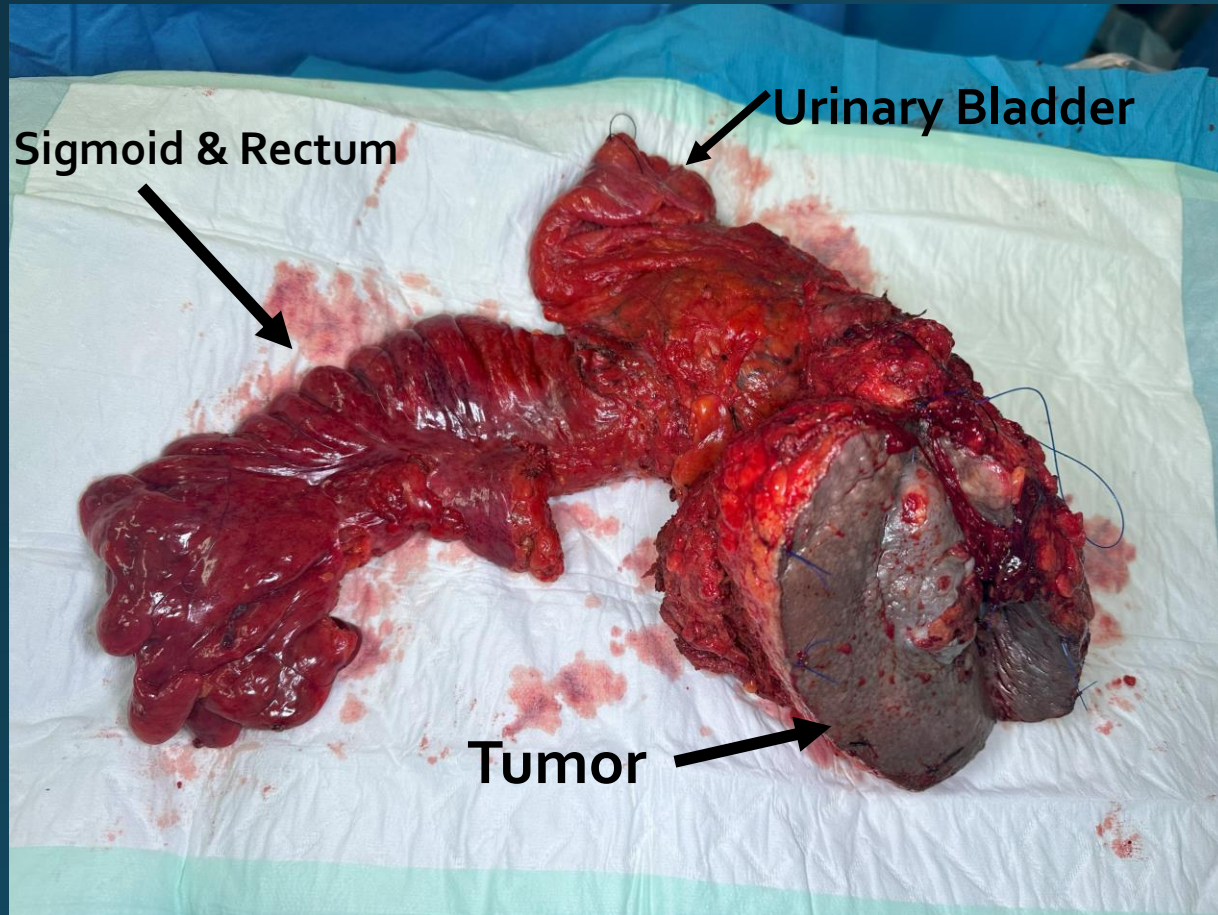
**Right Inferior Pubic
Ramus Junction**

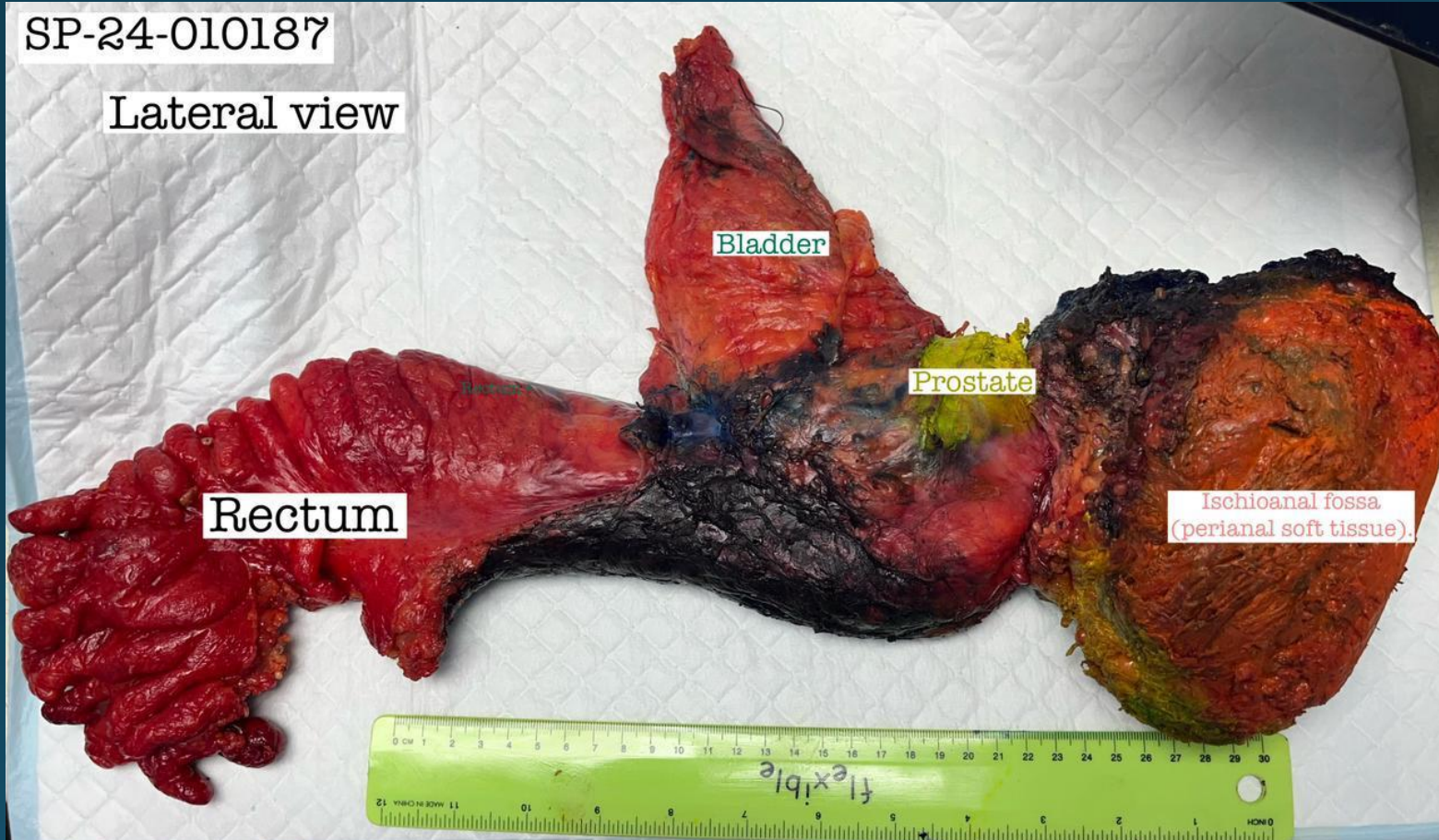
Distal End of Penile Urethra

**Right Ischial Tuberosity
Bed**

Gluteal Muscles













Conclusion

- These cases need to be done at a higher center by experienced surgeon and team.
- The patient has the right to be informed about this option and to be referred to the appropriate center.
- Because the other option will be....



Locally Advanced Rectal Cancer
MDT

rectalcancermdt@gmail.com

Raha Alahmadi

alahmadiraha@gmail.com