CASE REPORT

3D image reconstruction & processing for retrorectal tumor

Reconstrucción y procesamiento de imágenes 3D para tumores retrorrectales

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Abstract

3D reconstruction technology (3D-IPR) could be useful in pre-surgical planning in retrorectal tumors, which pose a surgical challenge due to their location and anatomical relationships. Magnetic Resonance Imaging (MRI) is an acceptable but not always satisfactory imaging test for pre-surgical planning, since the images can be difficult to interpret.

Key words: Retrorectal tumor, 3D reconstruction.

Resumen

La tecnología de reconstrucción 3D (3D-IPR) podría ser útil en la planificación pre-quirúrgica en tumores retrorectales, que suponen un desafío quirúrgico debido a su localización y sus relaciones anatómicas. La Resonancia Magnética (MRI) es una prueba de imagen aceptable aunque no siempre satisfactoria para la planificación pre-quirúrgica, dado que las imágenes pueden ser de difícil interpretación.

Palabras clave: Tumor retrorrectal, reconstrucción 3D.

Case presentation

We present the case of a 36-year-old female patient without previous pathological history, diagnosed incidentally in November 2019 of a retrorectal tumor through complementary tests carried during pregnancy follow-up. A C-Section was performed in October 2020. 3D-IPR was done based on MRI and provided visual representation of the tumor with its pelvic relationship to other structures that must be preserved. (**Figures 1-2**).

Surgery was finally performed in February 2021 by an open infraumbilical midline laparotomy exeresis with rectum suture repair and protective ileostomy. Pathology report confirmed a monodermal mature cystic teratoma. Ileostomy closure was performed after three months. (**Figure 3**).

After 30 months of follow-up there was no evidence of recurrence. (**Figure 4**).

Figure 1: MRI showing a large retrorectal tumor with rectum displacement.

Figure 2: 3D-IPR showing retrorectal tumor (yellow) with rectum right lateral displacement as well as its relationship with iliac vessels and urethers (light yellow) and levator ani muscles (faded brown).
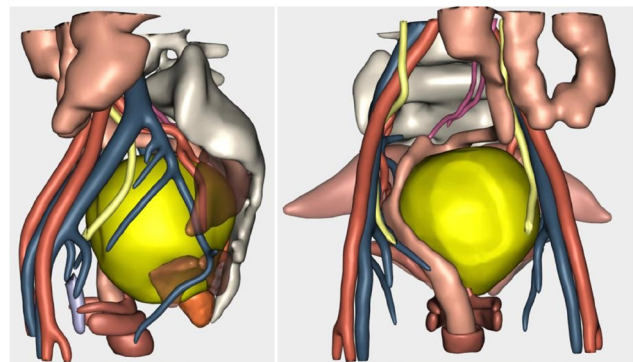

Figure 3: Surgical specimen compared to 3D-IPR specimen. 3D-IPR measured 11.45 cm as longitudinal length which is similar to complete extracted surgical specimen. Surgery performed was an open infraumbilical midline laparotomy exeresis with rectum suture repair and protective ileostomy. Pathology report confirmed a monodermal mature cystic teratoma. Ileostomy closure was performed after three months.
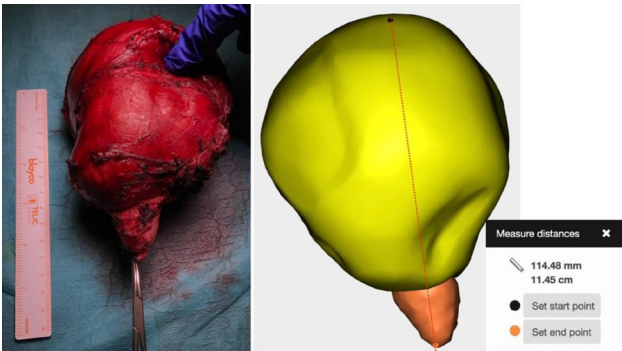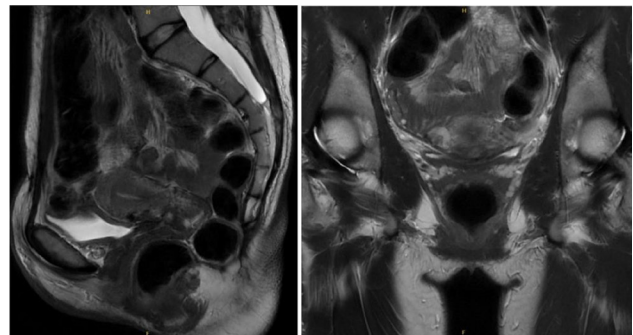

Figure 4: Post-operative MRI after three months of surgical intervention confirmed complete retrorectal tumor excision without any relapse.

Discussion

Retrorectal tumors are a rare heterogeneous group of lesions arising within retrorectal space, and though they are often benign lesions, they require resection to prevent potential malignant transformation, to control symptoms and to establish a definitive diagnosis.

It is important to avoid intraoperative opening of the mass and this requires surgical planning. For this reason imaging plays a crucial role in this kind of tumors. Conventional MRI is not always satisfactory for surgical planning due to difficulty interpreting structures, specially in case of inflammatory changes.

3D image reconstruction & processing (3D-IPR) and artificial intelligence (AI) can evaluate, using mathematical algorithms, if tumors infiltrate surrounding structures as it could change surgical attitude, improving surgical planning and reducing risk of intraoperative complications.

In this case, 3D-IPR identified a retrorectal tumor with right lateral rectal displacement as well as its relationship with iliac vessels, urethra and levator ani muscles. All of which provided the surgical team an enhaced visual representation to improve resection and post operative outcomes.

Conclusion

3D-IPR is an ideal strategy for surgical planning of these rare tumors, as they are surgically challenging due to their location and given the lack of standarized protocols of image acquisition.

Conflicts of Interest

The authors declare no conflict of interest.

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