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The use of pre-operative Intensity Modulated Radiotherapy (IMRT) with a simultaneous integrated boost (SIB) in Retroperitoneal Sarcomas (RPS).

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Background : The mainstay of treatment for RPS is surgery but, local recurrence rates remain high. Patterns of recurrence are poorly documented but those areas excised with an involved resection margins (R1) are likely to be at high risk of recurrence. Such R1 resections are common due to the large tumour size and close proximity to critical structures. Applying treatment protocols that are used in extremity soft tissue sarcomas non-randomised studies suggest pre-operative radiotherapy may improve local control rates in RPS. However, the large tumour volumes encountered can result in dose limiting toxicities to adjoining normal tissues necessitating a dose reduction. We have explored the role of Intensity Modulated Radiotherapy (IMRT) with a simultaneous integrated boost (SIB) as a single phase technique to allow optimal dose to the area of tumour considered at highest risk of an R1 resection whilst delivering a lower dose to the remaining tumour which is expected to be resected with a negative margin.

Methods and materials: FK, a 77 year old man, presented with a large RPS causing back pain and a weight loss. The tumour was closely applied to the posterior para-coloic gutter and an R1 resection was anticipated in this region. Pre-operative radiotherapy was therefore recommended to try and reduce the risk of local recurrence. Post-operative radiotherapy would have been difficult to deliver due to the potential large volume of bowel in the radiotherapy field. The patient was scanned at 5mm slices. Using the Pinnacle planning system, Gross Tumour Volume (GTV) was outlined and this was expanded to Clinical Target Volume (CTV) with a margin of 2 cm in all directions. Planning Target Volume (PTV1) was defined as CTV plus 5mm in all directions. A second PTV (PTV2) was created encompassing the area of tumour near the posterior abdominal wall, which was considered at high risk of local recurrence. The patient was treated with 7 beams IMRT using 10 MV photons. PTV1 was treated to a dose of 45 Gy in 25 fractions. Using a simultaneous integrated boost technique, PTV2 was given an extra 5 Gy to a total of 50 Gy in 25 fractions. Thus a standard pre-operative radiotherapy dose of 50 Gy in 25 fractions was delivered to the tumour without exceeding normal tissue toxicity

Results: Treatment was completed with minimal toxicity. Symptom improvement was noted during radiotherapy and FK underwent resection with close margins. The histology was confirmed as de-differentiated liposarcoma. Six months post-radiotherapy, the patient remains well without evidence of recurrence.

Conclusions: Based on our experience we conclude that pre-operative IMRT with SIB is feasible for large retroperitoneal tumours where dose constraints may compromise the use of standard pre-operative radiotherapy doses. Further studies examining the pattern of intra-abdominal recurrence are needed but this approach could be the basis for looking at dose escalation to those areas at high risk of recurrence. .