

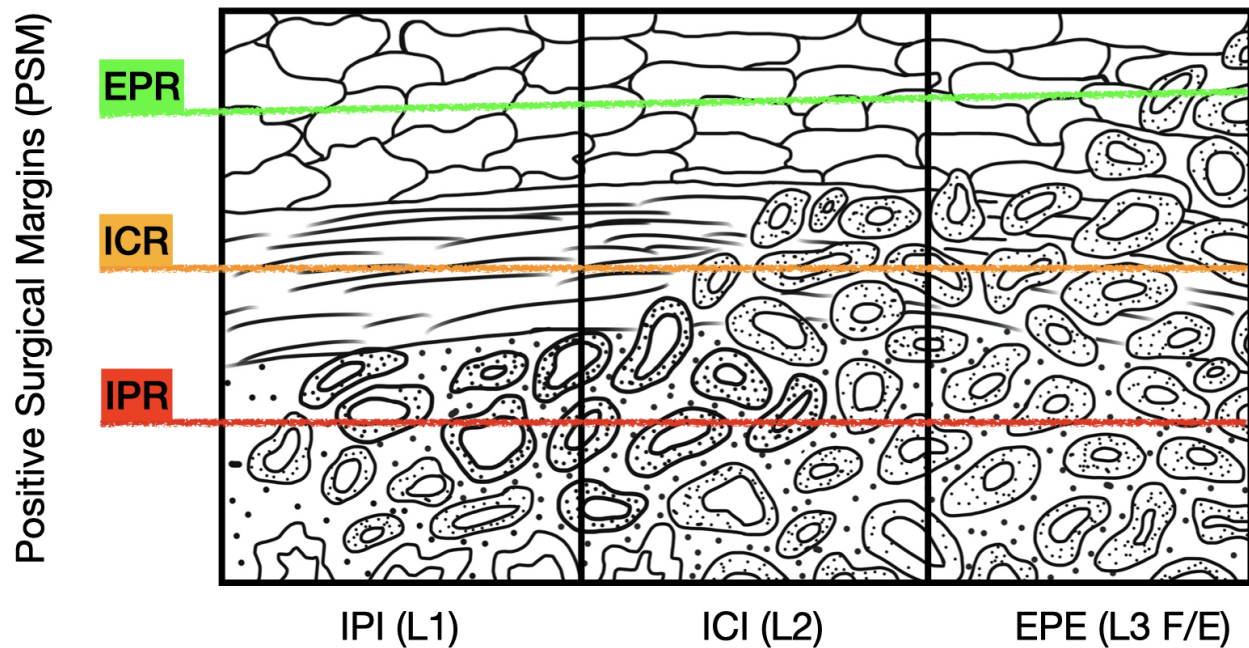
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Introduction & Objectives: Radical prostatectomy (RP) is performed in localised prostate cancer in curative intention. Positive surgical margins (PSM) strongly correlate with local recurrence rate and biochemical relapse. PSM emerge from inadvertent intraprostatic resection or extraprostatic resection of a locally advanced tumour. The objective of this study was to map prostatic capsular invasion (PCI) and PSM in relation to the capsule to develop a precise histopathologic grading system and measure objectively the quality of surgical resection.

Materials & Methods: In this retrospective study we analysed specimens of RP from 918 men in 2008 and 03/2011 to 02/2012 obtained from 7 sources comprising 17 surgeons. Histopathological examination of the prostates was performed by cutting 4 transversal lamellas from apex to base each divided in 12 zones to evaluate 48 zones per specimen in total. In every zone PCI (intraprostatic or intracapsular invasion and extraprostatic extension), PSM and the resection quality differentiated into intraprostatic resection (IPR), intracapsular resection (ICR) and extracapsular resection (ECR) were recorded for each zone (Fig.1). Resection quality was rated by defining ECR as optimal resection quality. PSM in zones of IPR and ICR were regarded as adverse events. Spearman's Rank-Order correlation as statistical test was performed to link PSM and resection quality in distinct zone locations.

Prostate Capsular Invasion (adapted from Ohori et al.)



Results: Histopathological workup of 805 prostate specimen were analysed per protocol. PCI showed even growth of PC beneath the capsule but penetration of the capsule in specific zones linked to dorso-lateral innervation. 166 cases with PSM were identified where 138 (83,1%) had adverse events. A significant correlation between PSM and resection quality could be established in 38 of 48 zones ($p < .05$; $r \geq -0.28$) identifying positions at risk for PSM in the dorso-apical zones through IPR and ICR. Despite most zones were resected optimal as EPR the rate of PSM in ICR was 6-fold and increased to 43-fold in IPR compared to EPR.

Conclusions: The biology of PCI was mapped in detail for the first time. Resection quality in RP can be measured objectively by an easy-applicable protocol. Scoring of resection quality could provide a viable feedback-tool to improve surgical practice and reduce PSM by 80% in RP.