·国内论著·

磁共振成像-超声融合穿刺联合系统穿刺在前列腺重复穿刺中的应用价值

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摘要：目的　探讨局部麻醉下经会阴磁共振成像-超声融合前列腺靶向穿刺用于既往活检阴性，但是前列腺特异抗原（prostate specific antigen，PSA）持续升高患者的诊断价值。**方法**　选取2018年7月至2021年3月在青岛大学附属烟台毓璜顶医院泌尿外科已行前列腺穿刺的56例患者，56例患者均行经会阴系统穿刺，52例患者在此基础上行磁共振成像-超声融合靶向穿刺，对不同穿刺方案的病理结果进行统计分析。**结果**　56例患者均顺利完成前列腺穿刺活检，均无严重并发症发生。病理确诊的总前列腺癌（prostate cancer，PCa）为23例，阳性率41.07%，其中临床有意义前列腺癌（clinically significant prostate cancer，csPCa）16例（69.87%）。融合穿刺检出PCa 14例，csPCa 12例（85.71%）；系统穿刺检出PCa 18例，csPCa 10例（55.56%）。单因素分析表明，csPCa与更大的年龄（P=0.001）、更小的前列腺体积（P=0.000）、更高的PSA浓度（P=0.001）以及磁共振成像评分5分（P=0.000）相关。Logistic回归分析表明，磁共振成像评分5分为csPCa的独立预测因素。**结论**　局麻下经会阴融合穿刺联合系统穿刺安全有效，能提高前列腺重复穿刺患者PCa及csPCa的检出率。

关键词：前列腺癌；磁共振成像；超声融合技术；前列腺活检；局部浸润麻醉

中图分类号：R445.2　　**文献标识码：**A　　**文章编号：**1674-7410(2021)04-0088-04

Value of Magnetic Resonance Imaging Ultrasound Fusion Puncture for Repeated Prostate Puncture

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Abstract: Objective　This study investigated the diagnostic value of transperineal magnetic resonance imaging ultrasound fusion prostate targeted puncture under local anesthesia in patients with a previous negative biopsy but a continual increase in prostate specific antigen (PSA). **Methods**　A total of 56 patients who had undergone transrectal ultrasound prostate puncture at Yantai Yuhuangding Hospital Affiliated with Qingdao University between July 2018 and March 2021 were studied. Some patients underwent additional targeted puncture. The pathological results of the different puncture schemes were statistically analyzed. **Results**　A total of 56 patients successfully completed prostate biopsy, and no serious complications were observed. A total of 23 cases of prostate cancer (PCA) were confirmed by pathology, with a positivity rate of 41.07%, and 16 cases of clinically significant prostate cancer (csPCa) were confirmed (69.87%). A total of 14 cases of PCA and 12 cases of csPCa were detected by fusion puncture (85.71%). PCA was detected in 18 cases, and csPCa was detected in 10 cases (55.56%). Univariate analysis showed that csPCa was associated with older age (P=0.001), smaller prostate volume (P=0.000), higher PSA concentration (P=0.001) and magnetic resonance imaging score 5 (P=0.000). Logistic regression analysis showed that MRI score of 5 was an independent predictor of csPCa. **Conclusion**　Transperineal fusion puncture combined with systematic puncture under local anesthesia is safe and effective, and can improve the detection rate of PCA and csPCa in patients with repeated prostate puncture.

Keywords: Prostate cancer; Magnetic resonance imaging; Ultrasonic fusion technology; Prostate biopsy; Local infiltration anesthesia

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超声引导下前列腺穿刺活检是临床诊断前列腺癌（prostate cancer，PCa）的金标准[1]，但该方法会漏诊20%～30%临床有意义前列腺癌（clinically significant prostate cancer，csPCa），由于经直肠系统活检对前列腺前尖部的取样不足，导致漏诊部位主要集中于前列腺前尖部[2]。经直肠穿刺还易出现出血、感染等并发症[3]。经会阴前列腺穿刺的方法能有效地获得前列腺前尖部癌组织[4]，并能避免对直肠黏膜的损伤，感染的发生概率也相对较低[5]。

提高csPCa检出率的关键在于对癌组织的精确穿刺。基于前列腺影像报告与数据系统（prostate imaging-reporting and date system，PI-RADS）v2评分的多参数磁共振成像，对csPCa有较高的敏感度[6-9]。将磁共振成像与超声融合，可针对影像学上的可疑病灶行靶向穿刺，提高csPCa的检出率[10-12]。

临床上经会阴前列腺穿刺活检多在全麻下进行，目前已有研究表明，局部麻醉下经会阴穿刺亦安全可行[13-15]。本研究旨在探讨局麻下经会阴磁共振成像-超声融合前列腺靶向穿刺在前列腺特异抗原（prostate specific antigen，PSA）异常，但活检阴性患者中的应用价值。

1 资料与方法

1.1 临床资料　选取2018年7月至2021年3月在青岛大学附属烟台毓璜顶医院泌尿外科已行经直肠超声前列腺穿刺的56例患者。纳入标准：①PSA>4 ng/ml；②既往经直肠超声系统穿刺结果为阴性。排除标准为：①存在磁共振成像或者穿刺的禁忌证；②既往接受融合靶向穿刺。本研究经青岛大学附属烟台毓璜顶医院伦理委员会批准，所有患者及家属均签署知情同意书。

1.2 检查仪器和方法

1.2.1 磁共振成像检查　所有患者均行3.0T多参数磁共振成像检查（荷兰飞利浦Ingenia CX 3.0T），扫描序列主要参数包括T1WI、T2WI、DWI。由1名10年以上前列腺磁共振成像阅片经验的医师对可疑区域按照PI-RADS v2标准评分。将PI-RADS v2评分3～5的病灶视为可疑病灶。

1.2.2 麻醉方法　穿刺体位选择截石位，聚维酮碘对会阴区及周围皮肤消毒，2%利多卡因20 ml对会阴皮肤局部浸润麻醉及前列腺周围阻滞麻醉。

1.2.3 前列腺穿刺　将磁共振成像结果输入MIM 5.2（美国MIM Software Inc）并与超声融合（图1）。在实时超声（丹麦BK）引导下，对所有被标记的可疑区域行靶向穿刺。单病灶患者行4针靶向穿刺。多病灶患者，每个靶点穿刺3针。最后均行12针经会阴系统穿刺（图2，图3）。csPCa的病理诊断依据包括：①Gleason评分>6分；②Gleason评分6分且穿刺针中活检癌组织长度超过4 mm[16]。

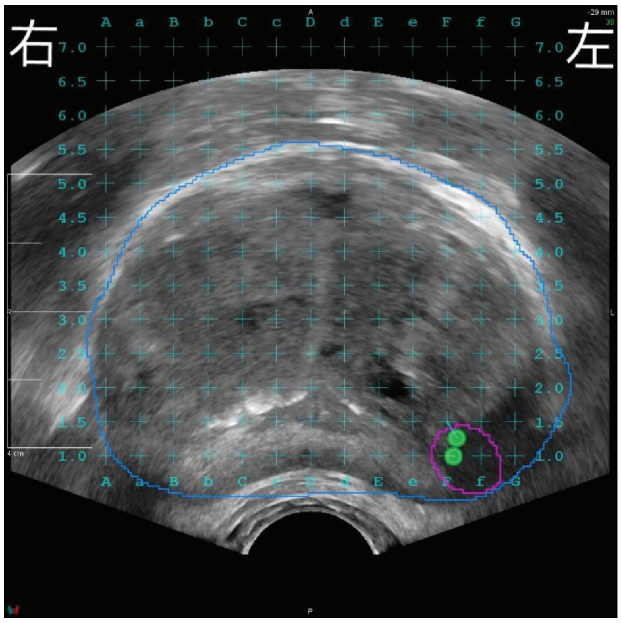

图2　磁共振成像-超声融合示意图

注：绿色标记为靶向病灶。

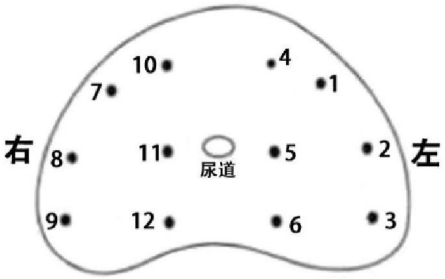

图3　经会阴12针前列腺系统穿刺位点分布示意图

1.3 统计学方法　采用SPSS 23.0统计学软件对研究数据进行分析和处理，中位数（四分位数间距）描述年龄、PSA浓度和前列腺体积，均数±标准差描述疼痛评分及穿刺总时间。Logistic回归分析协变量和csPCa的关系。$P<0.05$为差异有统计学意义。

2 结果

2.1 两种不同穿刺方法结果比较　对PI-RADS评分为3～5分的患者行融合穿刺联合系统穿刺，患者例数分别为28、16、8。1例1分患者和3例2分患者仅行局部麻醉下经会阴系统穿刺。共有23例（41.07%）患者检测出PCa，其中16例（69.60%）为csPCa。融合穿刺检出PCa14例，其中csPCa12例（85.71%），系统穿刺检出的18例PCa中csPCa仅占55.56%。两种穿刺方法的结果见表1。其中PI-RADS评分为

表 1　系统穿刺和融合穿刺结果比较[例（%）]

系统穿刺	良性病变	临床无意义前列腺癌	临床有意义前列腺癌	合计
融合穿刺				
良性病变	32(57.14)	5(8.92)	1(1.79)	38(69.64)
临床无意义前列腺癌	1(1.79)	0(0)	1(1.79)	2(3.57)
临床有意义前列腺癌	4(7.14)	2(3.57)	6(10.71)	12(21.43)
未行靶向穿刺	1(1.79)	1(1.79)	2(3.57)	4(7.14)
合计	38(69.64)	8(14.29)	10(17.86)	56(100.00)

3～5的患者csPCa的检出率分别为7.14%（2/28）、25.00%（4/16）和75.00%（6/8）。

2.2 临床因素与csPCa logistic回归分析　56例患者年龄66（60～71）岁。PSA浓度9.9（8.3～13.4）ng/ml。前列腺体积58（43～65）ml。所有患者均耐受穿刺过程且无需要临床治疗的并发症发生。穿刺用时为7～18 min，平均（11.04±1.71）min。

单因素逻辑回归分析结果显示，csPCa与更大的年龄、更小的前列腺体积以及更高的PSA浓度相关（P<0.05），见表2。多因素logistic回归分析结果显示，PI-RADS评分5分为csPCa的独立预测因素（OR=23.42），见表3。

表 2　单因素 logistic 回归分析结果

因素	χ^2值	P值	OR值
年龄	11.743	0.001	1.16
前列腺体积	16.535	0.000	0.91
前列腺特异抗原浓度	10.569	0.001	1.21
PI-RADS评分5分	14.863	0.000	33.27

注：PI-RADS评分为基于前列腺影像报告与数据系统评分。

表 3　多因素 logistic 回归分析结果

因素	χ^2值	P值	OR值
年龄	7.578	0.006	1.19
前列腺体积	10.100	0.001	0.92
前列腺特异抗原浓度	8.273	0.004	1.27
PI-RADS评分5分	5.575	0.018	23.42

注：PI-RADS评分为基于前列腺影像报告与数据系统评分。

3　讨论

PCa是一种严重影响男性健康的恶性肿瘤，发病率居男性肿瘤的第2位[17]。亚洲PCa发病率一直低于欧美国家，但随着经济水平的提高和生活水平的改变，PCa已成为发病率增长最快的恶性肿瘤之一[18]。早期PCa的手术治疗效果较好，而一旦发展成转移性PCa则预后较差[19]。因此，PCa的早期诊断是影响患者治疗效果的关键因素。

临床上多采用经直肠前列腺穿刺活检诊断早期PCa，但该方法假阴性率及并发症较高。磁共振成像-超声融合靶向穿刺作为PCa的辅助诊断手段之一，一般包括3个主要步骤：①磁共振成像检查；②专科医生分析磁共振成像图像并评估前列腺内可能有PCa的区域；③将带有标记可疑区域的磁共振成像图像与实时的超声图像融合并进行穿刺。该方法既提供了优质的影像资料又能实时超声引导，避免遗漏较小的病灶，从而提高PCa和csPCa的检出率。

相关文献也报道了其他穿刺方法来弥补传统穿刺方案的不足，包括经会阴饱和穿刺以及磁共振成像直接引导下的前列腺穿刺。相比较经直肠饱和穿刺，经会阴饱和穿刺可以在不增加无意义PCa的前提下减少并发症的发生，而经会阴靶向穿刺联合系统穿刺能以更少的穿刺针数获得更高csPCa检出率以及更低的并发症[20]。磁共振成像直接引导穿刺方法对PCa的诊断率为39%～59%，且大部分是csPCa[21-24]，缺点是穿刺时间长且花费高。磁共振成像-超声融合靶向穿刺联合系统穿刺方案耗时更短，耗费更少，同时能获得较高的PCa和csPCa检出率。

经会阴前列腺穿刺活检麻醉的特点在于经会阴皮肤而非经直肠黏膜，麻醉首先穿过会阴皮肤，平行于直肠对前列腺周围阻滞麻醉，避免了超声探头的限制，方便调整角度。目前，局麻下经会阴穿刺的疼痛控制已获得了较好的效果[14,25-26]。本研究中，56例患者均能耐受穿刺过程且无严重并发症发生，表明局麻下经会阴穿刺安全有效。

本研究中有4例csPCa仅在12针系统穿刺活检中被检出，而在附加的靶向穿刺中并未发现。以往的研究表明，融合靶向穿刺可能漏诊部分病理诊断的csPCa，因此磁共振成像靶向穿刺并不足以完全取代传统的系统穿刺方法[27]。

本研究主要不足包括以下几点：①为单中心试验且纳入患者数目相对较少；②临床随访时间有限，漏诊率不够精确；③不同机构间设备参数、设备质量以及医师操作技术不同，可能无法获得相同的诊断率。

综上所述，局麻下经会阴融合穿刺联合系统穿刺安全有效，并能提高既往活检阴性患者PCa的检出率，且大部分为csPCa。

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