

doi: 10.3978/j.issn.2095-6959.2022.05.025

View this article at: <https://dx.doi.org/10.3978/j.issn.2095-6959.2022.05.025>

前列腺穿刺活检在超声造影阳性区减针的初步研究

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[摘要] **目的:** 探讨前列腺穿刺活检中对比增强超声造影(contrast-enhanced ultrasonography, CEUS)阳性区减针穿刺的可行性及其应用价值。**方法:** 选取浙江大学医学院附属杭州市第一人民医院前列腺CEUS发现有阳性区域的可疑前列腺癌(prostate cancer, PCa)的120例患者, 随机采用2种不同的穿刺方法进行活检, 其中48例行10点系统穿刺法, 另72例采用造影阳性区减针穿刺法, 所有病例经手术病理证实。对比分析两种方法的检出率和并发症情况。**结果:** 120例患者中共诊断出PCa 76例(76/120, 63.3%), 系统穿刺组检出率64.6%(31/48), 减针组检出率62.5%(45/72), 两种穿刺法PCa的检出率差异无统计学意义($P=0.817$)。系统穿刺组31例PCa共穿刺311针, 其中阳性126针(40.5%), 减针穿刺组45例PCa共穿刺372针, 其中阳性276针(74.2%), 两组穿刺针数阳性率差异有统计学意义($P<0.001$)。系统穿刺组血尿等并发症发生率高于减针组(20.8% vs 6.9%), 差异有统计学意义($P=0.024$)。**结论:** 当前列腺CEUS发现有较大的阳性区域时, 采用适当的减针穿刺不会明显降低PCa检出率, 但提高了穿刺针数阳性率, 并降低了并发症的发生率, 具有一定临床应用价值。

[关键词] 前列腺; 对比增强超声造影; 穿刺活检

Preliminary study on reducing the number of needle punctures in the positive area of contrast-enhanced ultrasonography in prostate needle biopsy

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Abstract **Objective:** To explore the feasibility and application value of the reduction of the number of needle punctures in the positive area of contrast-enhanced ultrasonography (CEUS) in prostate needle biopsy. **Methods:** We selected 120 patients who had positive areas with suspected prostate cancer (PCa) in CEUS in the Affiliated Hangzhou First People's Hospital, Zhejiang University School of Medicine. Two different puncture methods were randomly used for biopsy,

收稿日期 (Date of reception): 2021-05-03

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基金项目 (Foundation item): 杭州市医药卫生科技发展计划 (A20200113)。This work was supported by Medical and Health Science and Technology Project of Hangzhou, China (A20200113).

including 48 patients with 10-point systematic puncture, and the other 72 patients with reduced-needle puncture in contrast-positive area. All cases were confirmed by surgery and pathology. The detection rate and complications of the 2 methods were compared and analyzed. **Results:** Among the 120 patients, 76 were diagnosed with PCa (76/120, 63.3%), the detection rate in the systemic puncture group was 64.6% (31/48), and the detection rate in the reduced-needle puncture group was 62.5% (45/72). There was no statistically significant difference in the detection rate of PCa between the 2 groups ($P=0.817$). A total of 311 tissues were obtained from 31 PCa patients in the systematic puncture group, of which 126 (40.5%) were positive, and a total of 372 tissues were obtained from 45 PCa in the reduced-needle puncture group, of which 276 (74.2%) were positive, with a statistically significant difference in the number of positive needle punctures between the 2 groups ($P<0.001$). The incidence of complications such as hematuria in the systemic puncture group was higher than that in the reduced-needle puncture group (20.8% vs 6.9%, $P=0.024$). **Conclusion:** When a large positive area was detected in prostate by CEUS, the use of appropriate reduced-needle puncture does not significantly reduce the detection rate of prostate cancer, but improve the rate of positive needle punctures and reduce the complications induced by puncture, which has certain clinical application value.

Keywords prostate; contrast-enhanced ultrasonography; needle biopsy

随着人口老龄化及生活质量的提高,我国男性前列腺癌(prostate cancer, PCa)发病率呈快速增长趋势^[1]。经直肠超声(transrectal ultrasonography, TRUS)引导下前列腺穿刺病理活检是诊断PCa的最常用手段^[2-4]。PCa病灶具有散在性、多灶性的特点^[5],目前多采用系统穿刺的方法,穿刺次数过多常会引起疼痛等并发症的发生。因此,如何提高穿刺效率,减少穿刺针数,降低并发症,成为前列腺穿刺关注的问题。对比增强超声造影(contrast-enhanced ultrasonography, CEUS)是一种能显示微血管灌注的实时动态显像技术,它能显示肿瘤内部的异常血流灌注情况,在鉴别PCa中具有重要作用^[6-8]。本研究将CEUS阳性区减针穿刺方法与系统穿刺法进行比较,初步探讨其在前列腺穿刺活检中的临床价值。

1 对象与方法

1.1 对象

选取2016年10月至2020年10月前列腺CEUS均发现有1枚“大结节”的患者120例。大结节是指

CEUS阳性区域超过系统穿刺(10点系统法,即选择前列腺周缘区旁正中、中部、外侧、移行区和内腺双侧各1针)2个穿刺点的范围。入选患者年龄51~79岁(表1)。所有患者随机分为2种不同的穿刺方法。其中48例行系统穿刺,另有72例对造影阳性区进行减针穿刺。所有病例均经最终手术病理组织学检查证实。本研究取得患者及家属理解并签署知情同意书。

1.2 仪器与方法

1.2.1 检查设备与CEUS剂

选用百胜MyLab Twice彩色多普勒超声诊断仪(意大利 Esaote百胜集团),配有对比脉冲序列(contrast pulse sequence, CPS)双平面直肠超声探头(型号:TRT33),凸阵频率为5.5~8.5 MHz,线阵频率为5.5~10 MHz,机械指数为0.11,动态范围为65 dB,焦点设置在感兴趣部位最下方。所有患者仪器参数设置保持一致。穿刺针选用美国ARGON公司生产的Biopince自动活检枪,针长20 cm的18G活检针。CEUS剂均采用意大利Bracco公司生产的SonoVue,造影剂成分为六氟化硫。

表1 两组患者年龄、血清PSA及前列腺大小的比较

Table 1 Comparison of age, serum PSA and prostate size between the 2 groups

组别	n	年龄/岁	T-PSA/(ng·mL ⁻¹)	F-PSA/(ng·mL ⁻¹)	前列腺体积/mL
系统穿刺组	48	66.4 ± 7.9	32.18 ± 19.80	3.55 ± 1.08	54.53 ± 3.56
减针穿刺组	72	67.9 ± 7.5	37.80 ± 17.00	3.30 ± 0.95	55.38 ± 4.31
χ^2		1.008	1.663	1.356	1.120
P		0.316	0.099	0.178	0.267

1.2.2 检查方法

在TRUS扫查二维灰阶模式下记录前列腺体积, 经常规扫查后, 进行CEUS检查, 主要包括前列腺基底部、中部、尖部3个切面。使用前注入生理盐水充分振荡均匀后每次抽出2.4 mL备用, 经肘部浅静脉团注入体内, 并用5 mL生理盐水冲注, 连续观察3 min以上, 并开始同步动态记录超声图像于超声仪硬盘中。回顾分析造影图像: 由2名具有5年以上工作经验的医师分别独立进行分析并记录造影增强表现特征, 如分析结论一致则为最终结果, 如分析结论不一致则由医生进行讨论, 达成一致后, 记录为最终结果。PCa CEUS判定方法^[8]: 快速增强、高增强、不对称增强血管、增强后内外腺分界不清、增强后快速消退。

1.2.3 前列腺穿刺活检

穿刺路径选择经会阴部穿刺。系统穿刺组采用10点穿刺法, 即选择前列腺周缘区旁正中、中部、外侧、移行区和内腺双侧各1针; 减针组对确定的大结节阳性病灶区(大于2个穿刺点)仅穿刺1针, 然后对该阳性区以外的部分按照10点法进行穿刺(图1, 图2)。进行减针穿刺时, 在完成穿刺后将探头转换为凸阵组, 在横切面上观察穿刺针, 确保穿刺点在目标位置, 如有偏差另补1针。

1.3 统计学处理

采用SPSS 16.0统计软件进行数据分析。计量资料以均数±标准差($\bar{x}\pm s$)表示。计数资料以例(%)表示, 比较采用 χ^2 检验。 $P<0.05$ 为差异有统计学意义。

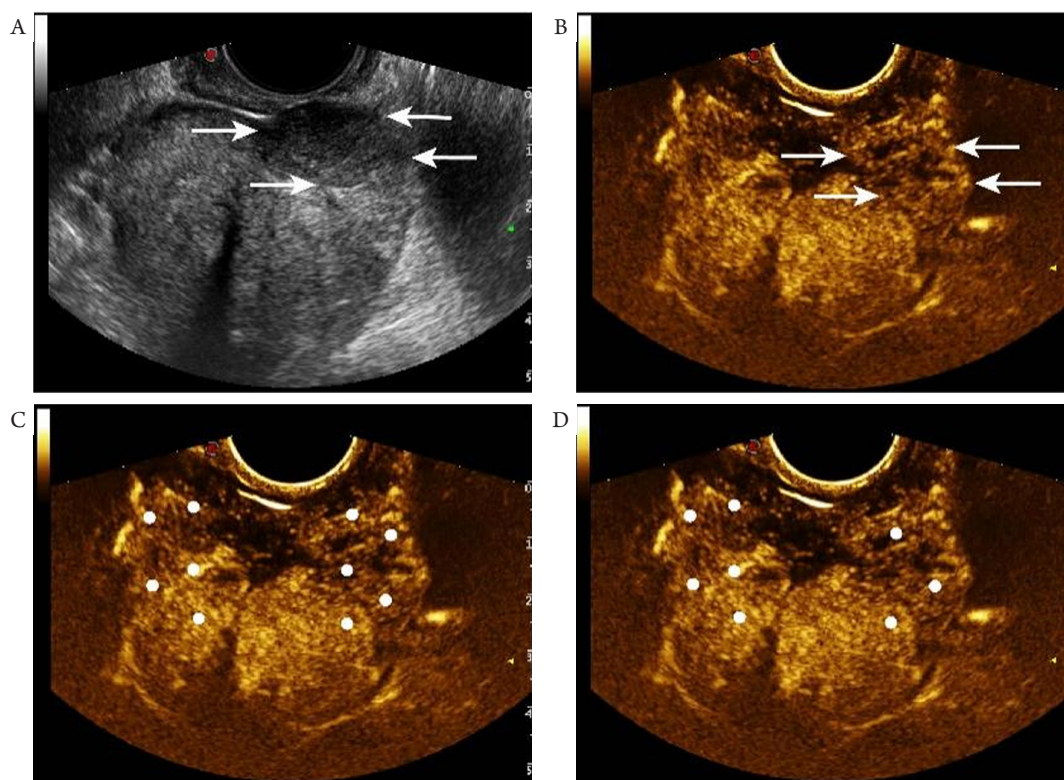


图1 二维超声发现有结节的患者CEUS及穿刺布针法

Figure 1 CEUS and needle puncture method in patients with detected nodules by 2-dimensional ultrasound

(A) TRUS前列腺左侧叶可见局部回声减低区(箭头); (B) CEUS示左侧外周带异常高增强区(箭头); (C) 10点系统穿刺布针示意图(白色圆点); (D) 减针后前列腺布针示意图(白色圆点)。

(A) Localized hypoechoic areas are shown in the left lobe of the prostate by TRUS (arrows); (B) CEUS demonstrates an abnormally hyper-enhanced area in the left peripheral zone (arrows); (C) Schematic diagram of 10-point system needle puncture placement (white dots) of prostate; (D) Schematic diagram of reduced-needle puncture placement (white dots) of prostate.

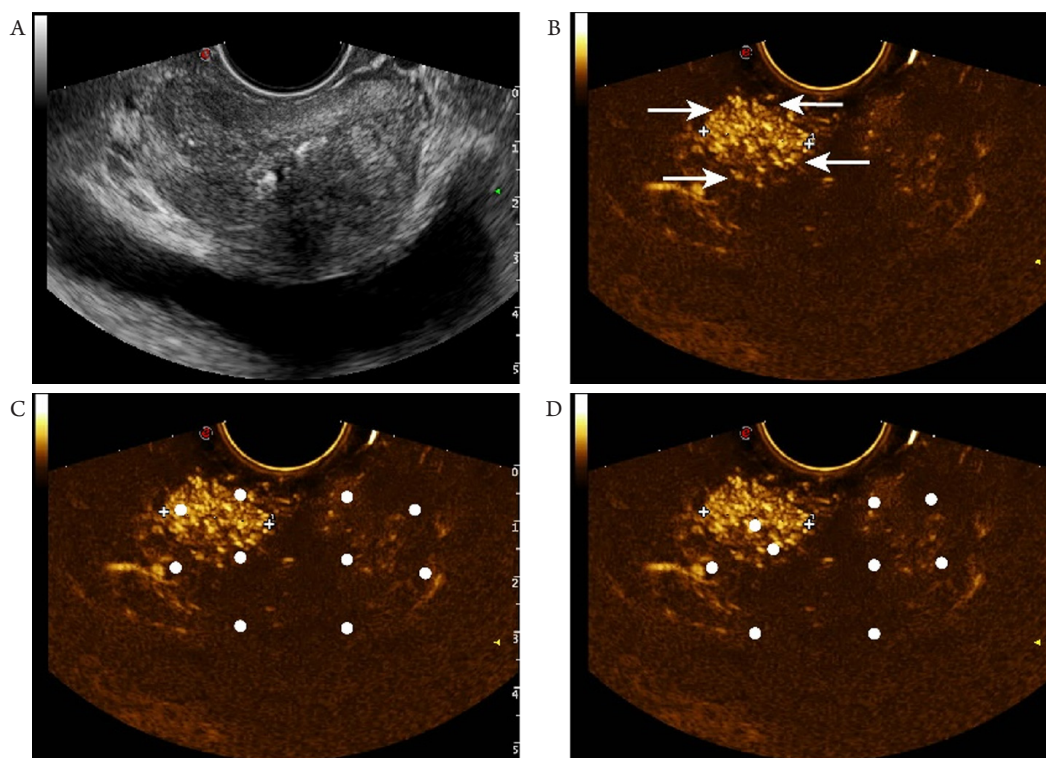


图2 二维超声未发现结节的患者CEUS及穿刺布针法

Figure 2 CEUS and needle puncture method in patients with undetected nodules by 2-dimensional ultrasound

(A) TRUS前列腺未见异常结节回声; (B) CEUS示右侧叶外腺异常高增强区(箭头); (C) 10点系统穿刺布针示意图(白色圆点); (D)减针后前列腺布针示意图(白色圆点)。

(A) There is no abnormal nodal echogenicity detected in the prostate on transrectal ultrasonography; (B) CEUS shows an abnormal hyper-enhanced area in the right peripheral zone (arrows); (C) Schematic diagram of the 10-point system needle puncture placement (white dots); (D) Schematic diagram of reduced-needle puncture placement (white dots).

2 结果

2.1 系统穿刺组与减针穿刺组患者的一般情况比较

两组患者年龄、总的前列腺特异性抗原(total prostate-specific antigen, T-PSA)、游离前列腺特异性抗原(free prostate-specific antigen, F-PSA)、前列腺容积差异均无统计学意义(表1)。

2.2 前列腺术后病理结果

120例患者均有最终的手术病理结果, 包括前列腺良性病变45例; PCa 75例(Gleason 评分3~9), 其中前列腺腺癌70例, 前列腺尿路上皮癌3例, 神经内分泌癌1例, 基底细胞癌1例。

2.3 减针穿刺组与系统穿刺组诊断结果比较

系统穿刺组共穿刺487针, 其中有7例因标本不满意, 每例多穿刺1针; 造影组共穿刺针623针,

其中25例患者每例穿刺8针(比常规法减2针), 44例患者每例穿刺9针(比常规法减1针), 另有3例患者造影确定每例减2针, 穿刺过程中因目标位置出现偏差补1针, 最后只减1针。系统穿刺组和减针穿刺组检出率分别为64.6%(31/48)和62.5%(45/72), 两组穿刺法PCa的检出率差异无统计学意义($P=0.817$)。系统穿刺组31例PCa共穿刺311针, 其中阳性126针(40.5%); 减针穿刺组45例PCa共穿刺372针, 其中阳性276针(74.2%), 两组穿刺针数阳性率差异有统计学意义($P<0.001$)。

2.4 穿刺并发症情况比较

系统穿刺组患者穿刺后发生肛区疼痛5例, 肉眼血尿2例, 发热1例, 迷走反射2例; 减针组患者穿刺后发生肛区疼痛2例, 肉眼血尿2例, 发热0例, 迷走反射1例(表2), 系统穿刺组血尿等并发症发生率高于减针组(20.8% vs 6.9%), 差异有统计学意义($P=0.024$)。

表2 两组患者穿刺阳性率及并发症比较

Table 2 Comparison of positive puncture rate and complications between the 2 groups

组别	n	穿刺病理/[例(%)]		并发症/[例(%)]	
		阳性	阴性	有并发症	无并发症
系统穿刺组	48	31 (64.6)	17 (35.4)	10 (20.8)	38 (79.2)
减针穿刺组	72	45 (62.5)	27 (37.5)	5 (6.9)	67 (93.1)
χ^2		0.054		5.079	
P		0.817		0.024	

3 讨论

TRUS引导下前列腺穿刺病理活检是诊断PCa的金标准, 已广泛应用于临床。但由于PCa具有多灶性、分散性的生长特点, 在穿刺活检时常难以确定穿刺的“靶区”, 存在一定的穿刺假阴性率。由Hodge等^[9]于1989年提出的前列腺6点系统穿刺法PCa漏诊率达到15%~34%, 为了提高检出率多数学者^[10]主张增加前列腺穿刺的点数。Frauscher等^[11]学者对比分析10点和14点穿刺发现: 穿刺针数从10点增加到14点, PCa的检出率并没有增加, 但增加了患者穿刺并发症的发生率。

随着影像技术的快速发展, 更多的常规二维超声不易发现的前列腺可疑靶向病灶得以通过影像图像显现。其中, CEUS技术是利用造影剂的强回声散射提高超声图像的对比分辨力、增加检测的敏感度和特异度的增强显像技术^[12-15], 能敏感地显示与PCa发生发展相关的新生微小血管。多项研究^[16-18]发现: PCa与良性腺体组织的微血管类型不同, 具有更多的微血管成分。微血管密度是反映前列腺肿瘤生物学行为的重要参数和指标^[17]。由于超声设备空间分辨率的局限性和小血管的血流缓慢, 常规彩色多普勒超声不能监测这些小血管内的血流^[19]。CEUS对PCa病灶的显示使造影引导靶向穿刺替代普通盲穿法成为可能。Sano等^[7]对比分析CEUS靶向穿刺与传统盲穿发现: CEUS靶向穿刺PCa的检出率(36.3%)高于传统盲穿(17.7%)。Jung等^[20]通过定量分析TRUS造影灌注曲线发现: 34例PCa中CEUS怀疑的有30例, CEUS有88%的敏感度和100%的特异度。

本研究主要针对CEUS发现的前列腺大结节阳性病灶(造影阳性区域超过系统穿刺2个穿刺点的范围), 一方面为了减少穿刺针数, 降低并发症的发生率, 对大结节病灶进行减针穿刺, 即对同源的大结节阳性病灶仅穿刺1针; 另一方面为

了提高前列腺穿刺的检出率, 对前列腺大结节阳性病灶以外的区域仍按照10点布针法进行穿刺。研究发现: 减针穿刺和系统穿刺PCa的检出率分别为64.6%和62.5%, 两种穿刺方案PCa的检出率差异无统计学意义。但系统穿刺组31例PCa阳性的有126针(40.5%), 减针穿刺组阳性的有276针(74.2%), 减针组穿刺针数阳性率更高($P < 0.001$)。系统穿刺组出现血尿等并发症发生率高于减针组(20.8% vs 6.9%), 差异有统计学意义($P = 0.024$)。大结节的减针穿刺在保证检出率的情况下提高了穿刺效能, 减少了穿刺针数, 相应地降低了血尿、肛周疼痛等穿刺后并发症的发生率, 也减少了盲目穿刺引起的患者的痛苦。

实时灰阶CEUS技术能通过对前列腺内异常血流的显示来帮助检测PCa病灶, 当前列腺CEUS发现有较大的阳性区域时, 采用适当的减针穿刺没有明显降低PCa检出率, 而且减少了穿刺针数, 降低了并发症的发生率, 提高了穿刺活检效率, 具有一定的临床应用价值。

参考文献

1. 叶定伟, 朱耀. 中国前列腺癌的流行病学概述和启示[J]. 中华外科杂志, 2015, 53(4): 249-252.
YE Dingwei, ZHU Yao. Epidemiology of prostate cancer in China: An overview and clinic implication[J]. Chinese Journal of Surgery, 2015, 53(4): 249-252.
2. Strazdina A, Krumina G, Sperga M, et al. The value and limitations of contrast-enhanced ultrasound in detection of prostate cancer[J]. Anticancer Res, 2011, 31(4): 1421-1426.
3. Moe A, Hayne D, et al. Transrectal ultrasound biopsy of the prostate: does it still have a role in prostate cancer diagnosis?[J]. Transl Androl Urol, 2020, 9(6): 3018-3024.
4. Song W, Kang M, Jeong BC, et al. The clinical utility of transperineal

- template-guided saturation prostate biopsy for risk stratification after transrectal ultrasound-guided biopsy[J]. *Investig Clin Urol*, 2019, 60(6): 454-462.
5. Chen ME, Johnston DA, Tang K, et al. Detailed mapping of prostate carcinoma foci: biopsy strategy implications[J]. *Cancer*, 2000, 89(8): 1800-1809.
 6. Mitterberger M, Pelzer A, Colleselli D, et al. Contrast-enhanced ultrasound for diagnosis of prostate cancer and kidney lesions[J]. *Eur J Radiol*, 2007, 64(2): 231-238.
 7. Sano F, Terao H, Kawahara T, et al. Contrast-enhanced ultrasonography of the prostate: various imaging findings that indicate prostate cancer[J]. *BJU Int*, 2011, 107(9): 1404-1410.
 8. 费翔, 唐杰, 李岩密, 等. 不同Gleason评分前列腺癌超声造影表现[J]. *中华医学超声杂志(电子版)*, 2011, 8(3): 517-524.
FEI Xiang, TANG Jie, LI Yanmi, et al. The difference in enhancement patterns of prostate cancer with different Gleason scores[J]. *Chinese Journal of Medical Ultrasound. Electronic Edition*, 2011, 8(3): 517-524.
 9. Hodge KK, McNeal JE, Terris MK, et al. Random systematic versus directed ultrasound guided transrectal core biopsies of the prostate[J]. *J Urol*, 1989, 142(1): 71-4; discussion 74-5.
 10. 廖新红, 朱尚勇, 杨红, 等. 前列腺系统活检结合血清PSA及经直肠超声对前列腺癌的诊断价值研究[J]. *中国超声医学杂志*, 2010, 26(8): 744-747.
LIAO Xinhong, ZHU Shangyong, YANG Hong, et al. Transrectal prostatic biopsy combined with serum prostate antigen and transrectal ultrasonography in diagnosis of prostate carcinoma[J]. *Chinese Journal of Ultrasound in Medicine*, 2010, 26(8): 744-747.
 11. Frauscher F, Klausner A, Volgger H, et al. Comparison of contrast enhanced color Doppler targeted biopsy with conventional systematic biopsy: impact on prostate cancer detection[J]. *J Urol*, 2002, 167(4): 1648-1652.
 12. Spàrchez Z, Radu P, Zaharia T, et al. Contrast enhanced ultrasound guidance: a new tool to improve accuracy in percutaneous biopsies[J]. *Med Ultrason*, 2010, 12(2): 133-138.
 13. Yusuf GT, Fang C, Tran S, et al. A pictorial review of the utility of CEUS in thoracic biopsies[J]. *Insights Imaging*, 2021, 12(1): 9.
 14. Caserta MP, Dahiya N, Tchelepi H, et al. Contrast-Enhanced Ultrasound-Guided Interventions-The New Sheriff in Town?: A Case-Based Review of Problem Solving With Ultrasound Contrast[J]. *Ultrasound Q*, 2020, 36(2): 91-101.
 15. Kessner R, Nakamoto DA, Kondray V, et al. Contrast-Enhanced Ultrasound Guidance for Interventional Procedures[J]. *J Ultrasound Med*, 2019, 38(10): 2541-2557.
 16. 陆殿元, 沈理, 蔡建荣, 等. 超声造影时间-强度曲线诊断前列腺癌[J]. *中国医学影像技术*, 2015, 31(8): 1255-1258.
LU Dianyuan, SHEN Li, CAI Jianrong, et al. Time-intensity curve of contrast-enhanced transrectal ultrasonography in diagnosis of prostate cancer[J]. *Chinese Journal of Medical Imaging Technology*, 2015, 31(8): 1255-1257.
 17. 孔凡雷, 方建华, 包凌云, 等. 超声造影引导减针在前列腺癌穿刺活检的应用[J]. *中国超声医学杂志*, 2015, 31(12): 1114-1116.
KONG Fanlei, FANG Jianhua, BAO Lingyun, et al. Clinical value of contrast-enhanced ultrasonography in the improving prostate biopsy with guiding reduce-cores puncture[J]. *Chinese Journal of Ultrasound in Medicine*, 2015, 31(12): 1114-1116.
 18. 谢少伟, 李凤华, 夏建国, 等. 超声造影定量分析评价前列腺良恶性组织血流灌注特征的初步研究[J]. *中国超声医学杂志*, 2010, 26(9): 826-829.
XIE Shaowei, LI Fenghua, XIA Jianguo, et al. Quantitative analysis in assessing perfusion characteristics of malignant and benign tissues of prostate with contrast-enhanced ultrasonography: A prospective study[J]. *Chinese Journal of Ultrasound in Medicine*, 2010, 26(9): 826-829.
 19. Halpern EJ. Contrast-enhanced ultrasound imaging of prostate cancer[J]. *Rev Urol*, 2006, 8(Suppl 1): S29-S37.
 20. Jung EM, Wiggermann P, Greis C, et al. First results of endocavity evaluation of the microvascularization of malignant prostate tumors using contrast enhanced ultrasound (CEUS) including perfusion analysis: first results[J]. *Clin Hemorheol Microcirc*, 2012, 52(2-4): 167-177.

本文引用: 方超, 黄山, 石敏捷, 孔凡雷, 方建华. 前列腺穿刺活检在超声造影阳性区减针的初步研究[J]. *临床与病理杂志*, 2022, 42(5): 1173-1178. doi: 10.3978/j.issn.2095-6959.2022.05.025

Cite this article as: FANG Chao, HUANG Shan, SHI Minjie, KONG Fanlei, FANG Jianhua. Preliminary study on reducing the number of needle punctures in the positive area of contrast-enhanced ultrasonography in prostate needle biopsy[J]. *Journal of Clinical and Pathological Research*, 2022, 42(5): 1173-1178. doi: 10.3978/j.issn.2095-6959.2022.05.025