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系统和四维超声对胎儿器质性异常筛检价值分析*

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摘要 目的:探究系统及四维超声在胎儿器质性异常筛选中的应用价值。**方法:**回顾性分析 2018 年 3 月至 2019 年 3 月于我院接受检查的 887 例中晚期产妇超声检测资料,所有产妇均行系统及四维超声检测,对比系统超声、四维超声和联合检测在胎儿器质性异常筛查中的特异性、敏感性和准确性,分析上述检查方式对不同胎儿器质性异常筛查的价值。**结果:**(1)887 例产妇共娩出 899 例胎儿,其中 87 例存在器质性异常,异常率 9.68 % (87/899),联合检测对器质性异常检出率为 94.25 % (82/87),系统超声检出率为 68.97 % (60/87),四维超声检出率为 79.31 % (69/87),联合检测明显优于单独检测($P<0.05$);(2)系统超声检测一致性为 96.05 %,灵敏度为 70.59 %,特异度为 98.54 %,四维超声一致性为 96.47 %,灵敏度为 75.40 %,特异度为 98.54 %,联合检测一致性为 99.57 %,灵敏度为 96.26 %,特异度为 99.90 %,对比发现联合检测一致性、灵敏度均优于单独检测。**结论:**系统及四维超声对胎儿器质性异常具有较好的筛查效果,联合检测筛查效果优于单独检测。

关键词:系统超声;四维超声;胎儿器质性异常;筛检

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The Value of Systematic and Four-dimensional Ultrasound in Screening Fetal Organic Abnormalities*

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ABSTRACT Objective: To explore the application value of system and four-dimensional ultrasound in screening fetal organic abnormalities. **Methods:** A retrospective analysis of 887 cases of middle and late stage parturients who were examined in our hospital from March 2018 to March 2019 was made. All parturients underwent systematic and four-dimensional ultrasound examination. The specificity, sensitivity and accuracy of systematic ultrasound, four-dimensional ultrasound and joint examination in the screening of fetal organic abnormality were compared, and the effects of the above examination methods on different fetal functions and organic characteristics were analyzed. The value of abnormal screening. **Results:** (1) 899 fetuses were delivered by 887 parturients, of which 87 had organic abnormalities, the rate of which was 9.68 % (87/899), 94.25 % (82/87), 68.97 % (60/87) and 79.31 % (69/87) respectively. The results showed that the consistency and sensitivity of combined detection were 96.05 %, 70.59 %, 98.54 %, 96.47 %, 75.40 %, 98.54 %, 99.57 %, 96.26 % and 99.90 %, respectively ($P<0.05$). **Conclusion:** The System and four-dimensional ultrasound have a better screening effect on fetal organic abnormalities, and the combined detection is better than the single detection.

Key words: System ultrasound; Four-dimensional ultrasound; Fetal organic abnormality; Screening

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前言

随着近些年我国二胎政策的逐步开放,新生儿出生率较往年有了一定提升,出生率的升高也增加了新生儿器质性异常的发生率^[1],流行性调查学显示,我国每年约有 80-100 万缺陷儿出生,占我国出生人口总数的 4 %-6 %^[2,3],严重的缺陷甚至可以直接导致胎儿的死亡或严重残疾,给新生儿家庭带来极大的经济负担,同时还会影响社会发展进步^[4,5]。经济的发展使提高人口素质成为各国卫生行政部门重要职责之一,及早发现胎儿器质性缺陷,是产前检查的首要目的,也是提高新生儿素质的

重要手段^[6,7]。近些年,超声检测在孕妇产检中的应用频率越来越高,临床研究发现,相比于其他手段,超声检查具有可重复强、准确率高、安全无痛等优点,已经成为产前筛检的首选方法^[8,9]。系统超声是排除畸形的重要手段,能够对胎儿脊椎、颜面部、心脏、腹部等实施系统性的检查,四维超声又被成为医学彩色超声成像技术,是指在三维的医学彩色超声成像基础上加上第四维时间矢量,相比于三维超声,对诊断质量有了进一步提升^[10,11]。我们通过研究发现,系统及四维超声对胎儿器质性异常具有较好的筛查效果,联合检测筛查效果优于单独检测,现详述如下。

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1 资料与方法

1.1 一般资料

选择 2013 年 3 月至 2019 年 3 月于我院接受检查的 887 例中晚期产妇为研究对象,其中单胎妊娠 875 例,双胎妊娠 12 例,共分娩新生儿 899 例,入组产妇年龄 20-43 岁,平均年龄 (32.62 ± 2.66) 岁,孕周 20~26 周,平均孕周 (23.03 ± 2.14) 周,孕次 1-3 次,平均孕次 (1.36 ± 0.21) 次,产次 1-3 次,平均产次 (1.26 ± 0.51) 次。

入组标准:(1)产妇意识清晰能够配合进行调研;(2)病历资料齐全;(3)调研经医院伦理学会批准实施;(4)产妇及其家属对本次调研过程、方法、原理清楚明白并签署知情同意书。

排除标准:(1)合并精神障碍者;(2)合并高危心血管疾病者;(3)合并严重肝肾功能障碍者;(4)合并凝血功能障碍者;(5)合并宫内感染者;(6)合并免疫系统疾病患者。

1.2 方法

所有入组产妇均实施系统超声及四维超声检测,选择仪器为飞利浦 Affiniti 50 型彩色超声诊断仪,系统超声探头为凸式探头,频率设置为 3.75-5.00 MHz,四维超声探头为经腹容积探头,频率设置为 3.00-6.50 MHz;系统超声检测时患者取仰卧位、侧卧位,对胎儿结构实施系统性检查,包括头颅、脑、鼻、唇、

眼、心脏、脊柱、四肢等结构,同时检测时实施生物参数测量,如果发现可疑部位,可再次反复实施探查,确定最终结果;四维超声检测操作与系统检测基本一致;联合检测时,首先使用四维容积确定采样框,使用常规扫描以建立动态立体成像,而后对可疑部位实施反复扫描,获得清晰的图片后存档。

1.3 观察指标及评测标准

一致性 $= (A+D)/(A+B+C+D)$, 灵敏度 $= A/(A+C)$, 特异度 $= D/(B+D)$, 其中 A 为真阳性, B 为假阳性, C 为假阴性, D 为真阴性^[12]。

1.4 统计学方法

使用 SPSS 19.0 对采集的数据实施分析,计数资料以率(%)的形式表示,采用卡方检验, $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 胎儿畸形情况分析

经检测分析发现,887 例产妇共娩出 899 例胎儿,其中 87 例存在器质性异常,异常率 9.68 % (87/899),联合检测对器质性异常检出率为 94.25 % (82/87),系统超声检出率为 68.97 % (60/87),四维超声检出率为 79.31 % (69/87),联合检测明显优于单独检测 ($P < 0.05$),如表 1。

表 1 胎儿畸形情况分析(例,%)
Table 1 Analysis of fetal malformation (n,%)

Fetal malformation type	Confirmed condition	Systemic ultrasound	Four-dimensional ultrasound	Joint detection
nervous system	24	21	23	29
Digestive system	16	13	14	15
Genitourinary system	13	5	16	19
Fetal tumor	11	5	2	3
Facial	6	2	7	8
Skin edema	5	4	3	0
Heart	5	4	2	3
Pleural effusion	7	6	2	5
Total	87 (9.68)	60 (68.97)	69 (79.31)	82 (94.25)*

Note: Compared with system ultrasound and 4D ultrasound, * $P < 0.05$.

2.2 各类检测方式对胎儿器质性异常诊断一致性、灵敏度和特异度

经检测发现,系统超声检测一致性为 94.33 %,灵敏度为 60.92 %,特异度为 97.91 %,四维超声一致性为 92.99 %,灵敏度为 68.97 %,特异度为 98.90 %,联合检测一致性为 99.00 %,灵敏度为 91.95 %,特异度为 99.75 %,对比发现联合检测一致性、灵敏度均优于单独检测,如表 2、表 3、表 4 及表 5 所示。

3 讨论

据 2012 年我国卫生部统计数据显示,我国新生儿器质性异常的发生率为 5.6 % 左右^[13],临床研究指出,胎儿出现器质性异常原因较多,包括母体因素、环境因素、遗传因素等都会对胎儿器质性异常的出现造成影响^[14,15]。为有效减小此类事件的发生,贯彻国家优生优育政策指示,产妇产中期的检查意义重

表 2 系统超声对胎儿器质性异常诊断一致性、灵敏度和特异度

Table 2 System ultrasound for the diagnosis of fetal organic abnormality consistency, sensitivity and specificity

Systemic ultrasound	Gold standard positive (n=87)	Gold standard negative (n=812)
Positive (n=60)	53	7
Negative (n=829)	34	795

表 3 四维超声对胎儿器质性异常诊断一致性、灵敏度和特异度

Table 3 Consistency, sensitivity and specificity of four-dimensional ultrasound in the diagnosis of fetal organic abnormalities

Four-dimensional ultrasound	Gold standard positive(n=87)	Gold standard negative(n=812)
Positive(n=69)	60	9
Negative(n=830)	27	803

表 4 联合检测对胎儿器质性异常诊断一致性、灵敏度和特异度

Table 4 Diagnostic consistency, sensitivity and specificity of combined detection for fetal organic abnormalities

Joint detection	Gold standard positive(n=87)	Gold standard negative(n=812)
Positive(n=82)	80	2
Negative(n=817)	7	810

表 5 不同检测方式一致性、灵敏度和特异度对比 (例,%)

Table 5 Comparison of consistency, sensitivity and specificity of different detection methods (n,%)

Detection mode	Uniformity	Sensitivity	Specificity
System ultrasound	94.33	60.92	97.91
Four-dimensional ultrasound	92.99	68.97	98.90
Joint detection	99.00	91.95	99.75

大^[16]。实践发现,超声检测是目前应用最广泛的产前胎儿器质性异常筛查辅助技术,相比于其他手段,超声检测具有操作简单、可重复性高、快捷安全等优点,因而推广程度较高^[17,18]。

传统胎儿超声检测多采用二维超声,二维超声检测能够对胎儿在宫内的发育情况进行检查,但仅能获得二维切面图像^[19],胎儿全身检测需要经多次扫描多个切面才能够完成感兴趣区域完整影像的建立,且二维超声受医师经验和手法影响较大,对畸形胎儿判断难度较大,对微小畸形易出现误诊漏诊,因而目前应用较少^[20,21]。系统超声检测是临床上用于胎儿畸形排查的重要手段,能够对胎儿的全身实施系统性的检测,具有较高分辨率的仪器能够胎儿多项畸形进行诊断,尤其是心脏系统及颜面等精细部位的畸形检出率较传统二维超声有了明显的提高^[22,23]。学者 Milo Prisbrey^[24]通过对 10450 例孕产妇实施产前筛查发现,系统超声共检出畸形胎儿 119 例,漏诊 4 例,漏检率 3.3%,检出率 96.7%,提示系统超声在孕中期胎儿畸形筛查中应用价值明显,能够有效降低胎儿出生缺陷的发病率。学者 Jan Hodgson^[25]等也通过对 1600 例孕妇实施系统超声检测发现,系统超声对胎儿畸形的检出率和漏检率分别为 86.96%和 13.04%,应用价值较好。四维超声是在三维医学彩色超声呈现基础上增加时间维度的检测方式,此类检查方式为临床诊断提供了更为丰富的影像信息,进一步减少了病灶的漏诊率,提高了诊断质量,在胎儿发育异常、心血管畸形等方面具有较好的诊断价值^[26,27]。学者 Hostalery L^[28]等通过对 12782 例产妇实施筛查发现,四维超声对胎儿心脏畸形筛查准确率为 98.52%,漏诊率为 0.99%,误诊率为 0.49%,提示四维超声在胎儿心脏畸形诊断中具有较好的临床应用价值,能够有效弥补二维超声诊断不完善、不精确的缺点,提高产前胎儿畸形筛查的准确率。

我们通过对 887 例产妇实施回顾性分析发现,899 例胎儿中存在器质性异常的有 87 例,系统超声检出率为 68.97%,四维超声检出率为 79.31%,联合检测检出率为 94.25%,该数据

说明联合检测对胎儿器质性异常检出效果明显优于单独检测。同时进一步的分析显示,对胎儿器质性异常,系统超声检测一致性为 94.33%,灵敏度为 60.92%,特异度为 97.91%,四维超声一致性为 92.99%,灵敏度为 68.97%,特异度为 98.90%,联合检测一致性为 99.00%,灵敏度为 91.95%,特异度为 99.75%,对比分析发现联合检测一致性、灵敏度均优于单独检测。我们分析认为,本文检测结果显示系统超声对胎儿器质性异常检测一致性、灵敏度和特异度最低,提示系统超声存在一定的技术局限,而相比于系统超声,虽然四维超声能够构建胎儿立体空间图像,更为直观的显示胎儿组织结构,对胎儿微小畸形如眼、鼻部位畸形检测效果较好,但四维超声易受胎儿体位、孕周、羊水量等因素的影响^[29,30]。而联合检测能够综合系统超声与四维超声的优点,最大限度降低检测误差,提高筛查的准确率,形成优势互补,为胎儿畸形诊断提供更准确的数据。

总而言之,系统及四维超声对胎儿器质性异常具有较好的筛查效果,联合检测筛查效果优于单独检测,值得临床推广应用。

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