 doi:10.3969/j.issn.1005-202X.2015.05.013

二维数字减影血管造影和三维CT血管成像诊断颅内动脉瘤204例临床分析

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【摘 要】**目的:**回顾性分析和评价用二维数字减影血管造影(Two-Dimensional Digital Subtraction Angiography, 2D-DSA)和三维CT血管成像(Three-Dimensional Computed Tomo Graphicangiography, 3D-CTA)诊断颅内动脉瘤的临床价值并讨论其意义。**方法:**2009年1月~2014年12月确诊的颅内动脉瘤患者204例(286个动脉瘤),男性90例,女性114例,年龄(48.6±16.8)岁。用2D-DSA和3D-CTA检查,并对比两种检查方法对患者不同大小和部位颅内动脉瘤检出情况。外科手术治疗包括脉瘤夹闭128例(206个动脉瘤)和介入76例(80个动脉瘤)。**结果:**(1)根据瘤体大小,2D-DSA检出273个(95.4%),漏诊13个(4.6%);3D-CTA检出263个(92.0%),漏诊23个(8.0%);(2)根据不同部位,2D-DSA检出277个(96.8%),漏诊9个(3.2%);3D-CTA检出266个(93.0%),漏诊20个(7.0%)。根据动脉瘤体大小和部位分析,2D-DSA与3D-CTA检出率均无统计学差异(P>0.05)。手术治疗1~3个月后,临床治愈126例(61.8%),好转40例(19.6%),治愈好转率81.4%(166/204),恶化17例(8.3%),死亡21例(10.3%)。**结论:**2D-DSA和3D-CTA对颅内动脉瘤的诊断价值一致,而3D-CTA更具潜在的发展趋势。颅内动脉瘤应以手术治疗为主。

【关键词】三维CT血管成像;数字减影血管成像;颅内动脉瘤
【中图分类号】R445.2　　【文献标识码】A　　【文章编号】1005-202X(2015)05-0674-04

Two-dimensional digital subtraction angiography and three-dimensional computed tomography angiography for intracranial aneurysms: 204 cases analysis

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Abstract: Objective To retrospectively analyze and evaluate the diagnosis value of two-dimensional digital subtraction angiography (2D-DSA) and three-dimensional computed tomography angiography (3D-CTA) for intracranial aneurysms. **Methods** From January 2009 to December 2014, 204 patients diagnosed with intracranial aneurysm, with 286 aneurysms, were selected, 90 males, 114 females, aged (48.6±16.8) years old. Patients were examined by 2D-DSA and 3D-CTA. And the detection of intracranial aneurysms of different sizes and different sites were compared between these two groups. Operation treatments included 128 cases, with 206 aneurysms, treated by clipped operation and 76 cases, with 80 aneurysms, treated by interventional therapy. **Results** According to the size, 273 aneurysms were detected by 2D-DSA, with the detection rate of 95.4%, and 13 cases were missed diagnosis, with the missed diagnosis rate of 4.6%, while 263 aneurysms were detected by 3D-CTA, with the detection rate of 92.0%, and 23 cases were missed diagnosis, with the missed diagnosis rate of 8%. According to

【收稿日期】2015-05-27
【基金项目】国家自然科学基金(81200247)
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the site, 277 aneurysms were detected by 2D-DSA, with the detection rate of 96.8%, and 9 cases were missed diagnosis, with the detection rate of 3.2%, while 266 aneurysms were diagnosed by 3D-CTA, with the detection rate of 93.0%, and 20 cases were missed diagnosis, with the missed diagnosis rate of 7.0%. According to the size and site of the aneurysm, no significant differences were found in the detection rate of aneurysms between 2D-DSA and 3D-CTA (P>0.05). After 1 month-3 months of the operation treatment, 126 cases were cured (61.8%), and 40 cases got better (19.6%), so the cure and improvement rate was 81.4% (166/204), however, 17 cases were deteriorated (8.3%), and 21 cases were dead (10.3%). **Conclusion** The clinical values of 2D-DSA and 3D-CTA have no significant differences in the diagnosis of intracranial aneurysm, but the development of 3D-CTA is more potential. And intracranial aneurysms should be mainly treated by operation.

Key words: three-dimensional computed tomography angiography; two-dimensional digital subtraction angiography; intracranial aneurysm

前　言

原发性蛛网膜下腔出血(Subarachnoid Hemorrhage, SAH)是颅内动脉瘤(Intracranial Aneurysm)的主要原因,其发病率在脑血管疾病中居第3位。由于大多数病变发生在Willis环及其附近分支动脉,故致残率和死亡率很高,二次破裂出血的死亡率可达85%以上[1-3]。颅内动脉瘤的早期诊断和处置对预后十分重要。临床研究证明,诊断颅内动脉瘤的“金标准”是二维数字减影血管造影(Two-Dimensional Digital Subtraction Angiography, 2D-DSA),但三维CT血管成像(Three-Dimensional Computed Tomo Graphicangiography,3D-CTA)技术由于其快速无创和操作简便,同时可以三维显示颅内动脉瘤及其周围状况等特点也受到临床广泛重视[4-6]。我们用2D-DSA和3D-CTA对颅内动脉瘤患者进行检测,比较分析诊断结果和各自优势为临床提供依据,并对此进行讨论。

1　对象和方法

1.1　对象

收集2009年1月~2014年12月(陕西省第四人民医院和兰州军区兰州总医院)确诊的颅内动脉瘤患者204例(286个动脉瘤),男性90例,女性114例,年龄21岁~76岁,平均年龄(48.6±16.8)岁。Hunt-Hess分级:0级12例,Ⅰ级66例,Ⅱ级94例,III级32例,无Ⅳ~Ⅴ级病例。全部患者均经开颅动脉瘤夹闭术或介入治疗证实颅内动脉瘤,术前均行2D-DSA,在2 d内行3D-CTA检查。

1.2　方法

204例患患者包括动脉瘤286个,按直径大小分为微小动脉瘤(≤2 mm),小动脉瘤(3 mm~5 mm),一般动脉瘤(6 mm~10 mm),大动脉瘤(11 mm~25 mm)和巨大动脉瘤(>25 mm)。用2D-DSA和3D-CTA检测并对比分析不同大小和不同部位的颅内动脉瘤检出率。全部患者根据诊断时体征、症状、头颅影像学检测结果,以及患者不同特点,选择对其进行手术(动脉动瘤夹闭或塞栓)和内科治疗。

1.2.1　2D-DSA检查　使用万东CGO-3000血管机,采用Seldinger技术穿刺右侧股动脉,以5F单弯导管(COOK公司)置于双侧颈内动脉及双侧椎动脉行常规正、侧位造影,部分患者加照特殊位置以显示动脉瘤。造影后由有经验的介入医师进行影像分析。

1.2.2　3D-CTA检查　应用GE lightspeed 32层螺旋CT机扫描,所有检查患者扫描范围均从第一颈椎下缘至颅顶,分别做平扫和增强扫描。增强扫描时自右肘前静脉经高压注射器注射非离子对比剂碘佛醇(320 mgI/mL)100 mL,流率为3 mL/s ~4 mL/s,延迟时间为20 s~25 s,开始扫描,扫描参数为120 kV,280 mA, 原始数据以0.625 mm层厚进行重建,将重建的图像数据传至后处理工作站。由有经验的CT诊断医师在GE AW4.3工作站进行图像分析。主要采用容积重建(Volume Rendering, VR)和最大密度投影(Maximum Intensity Projection, MIP)技术对图像进行分析。

2　结　果

2.1　颅内动脉瘤检出率

204例患者286个动脉瘤中,根据不同大小分析,2D-DSA检出273,漏诊13个,检出率95.4%。3D-CTA检出263个,漏诊23个,检出率92.0%。相比较于2D-DSA,3D-CTA检出率稍低,但无统计学意义(P>0.05,表1)。根据不同部位分析,2D-DSA检出277个,漏诊9个,检出率96.8%。3D-CTA检出266个,漏诊20个,检出率93.0%。相比较于2D-DSA,3D-CTA检出率稍低,但无统计学意义(P>0.05,表1)。

2.2　手术治疗效果

本组204例(286个动脉瘤)患者中,外科手术治疗包括动脉瘤夹闭128例(206个动脉瘤)和介入76例

表1 2D-DSA和3-D-CTA诊断脑动脉瘤结果比较[*n* (%)]

Tab.1 Diagnosis results of 2D−DSA and 3D−CTA for intracranial aneurysm [*n* (%)]

Intracranial aneurysm	*n*	2D-DSA	3D-CTA
Location			
Vertebrobasilar aneurysm	30	28(93.3)	30(100.0)
Multiple aneurysm	28	28(100.0)	26(92.8)
Anterior cerebral artery aneurysm	36	35(97.2)	33(9403)
Middle cerebral artery aneurysm	26	26(100.0)	24(92.3)
Intracranial aneurysm	40	34(85.0)	36(90.0)
Internal carotid aneurysm	50	50(100.0)	47(94.0)
Anterior communicating aneurysm	32	30(93.8)	29(90.6)
Posterior communicating aneurysm	34	32(94.1)	30(88.2)
Choroid artery aneurysm	4	4(100.0)	3(75.0)
Small epencephalic aneurysm	6	6(100.0)	5(83.3)
Total	286	273(95.4)	263(92.0)
Diameter (mm)			
Tiny aneurysm (≤2)	82	79(96.3)	77(93.9)
Micro-aneurysm (3-5)	62	59(95.2)	58(93.5)
General aneurysm (6-10)	104	101(97.1)	95(91.3)
Macro-aneurysm (11-25)	24	24(100.0)	22(91.7)
Giant aneurysm (＞25)	14	14(100.0)	14(100.0)
Total	286	277(96.8)	266(93.0)

Note: 2D-DSA: Two-dimensional digital subtraction angiography; 3D-CTA: Three-dimensional computed tomography angiography

(80个动脉瘤)。结果手术治疗(1~3)个月后,临床治愈126例(61.8%),好转40例(19.6%),治愈好转率81.4%(166/204),恶化17例(8.3%),死亡21例(10.3%)。随访(1~4)年(平均22个月)139例中,119例(85.6%)病情稳定,死亡3例(2.2%),复发的17例(12.2%),经二次手术治愈好转14例,死亡3例。

3 讨 论

颅内动脉瘤的病因主要与先天性发育异常有关,但内皮型一氧化氮合酶基因(eNOS)G-894T、T-786C多态性与散发性颅内动脉瘤也有一定相关性[2, 5-7]。由于局部动脉的结构变化特点,颅内动脉瘤大多数发生在Willis环及其分支血管,同时存在相对薄弱的血管壁、外伤等因素很容易导致动脉局部异常性扩张形成动脉瘤。原发性蛛网膜下腔出血最常见原因是颅内动脉瘤破裂,致死率和致残率都很高,首次破裂出血致死率为10%~15%,2周内20%~50%会再次破裂出血,其死亡率接近85%[7-9],因此早期诊断和处理对其预后尤为重要。

颅内动脉瘤最准确的检查方法是2D-DSA与3D-CTA,这一方法已成为诊断颅内动脉瘤和术前精确评估最重要的手段[2, 10-14]。研究表明,3D-CTA检测颅内动脉瘤的灵敏性在88%~100%,而2D-DSA的灵敏性接近100%,因此认为2D-DSA仍然是颅内动脉瘤诊断的"金标准"。3D-CTA检查是从外周静脉快速注射造影剂后用螺旋CT对头颅行连续薄层扫描,通过计算机工作站重建脑血管及其颅骨结构的三维立体影像。这种检查创伤小、时间短,费用也相对较低,在颅内动脉瘤的诊断上已得到广泛应用[15-18]。我们认为,当颅内动脉瘤直径>3 mm时,选择2D-DSA或3D-CTA检查结果一致,当动脉瘤直径≤3 mm,2D-DSA检查更有优势。可能的原因是3D-CTA检测时,部分容积效应和噪声影响使分辨率降低,从而显示微小动脉瘤能力下降[7-9, 19-22]。本文研究表明,3D-CTA和2D-DSA结果相近,与报道一致。

临床上的急重症患者,特别是不能耐受2D-DSA检查等患者,进行3D-CTA是首选检查方法[5]。3D-CTA和2D-DSA检查互为补充,对临床疑难重症颅内动脉瘤患者检查更具为重要。2D-DSA作为一种传统诊断颅内动脉瘤的"金标准",对脑血管血流动力学方面的病变可以清晰地反应,对不同部位和不同大小颅内动脉瘤,特别是邻近颅底骨质的动脉瘤的诊断有明显的优势,具有不可替代的作用。但3D-CTA操作简单、无创伤,敏感性高和3维图像任意角度旋转,在显示动脉瘤的形状、瘤颈和具体指向,以及与周围组织的关系等方面明显优于2D-DSA。

观察动脉瘤内血流动力学状况的4D-CTA(Four-Dimensional Computed Tomographicmovie Angiography)动画诊断已应用于临床[23-24],通过观察成长性动脉瘤内血流呈现不规则搏动状态,可用来判断动脉瘤的发展和破裂口部位;通过观察夹层动脉瘤内的血流呈线状流动,可用来提示动脉夹层和血管内膜瓣间的位置关系和诊断信息等,特别是作为SAH患者的常规影像学评价更是重要的手段[25-26]。影像技术的变革与发展使颅内动脉瘤诊断日趋于多元化,数字化血管造影成为诊断颅内动脉瘤的重要检查方法。3D-CTA在动脉瘤诊治中的应用逐步扩大,正在逐步成为一种新的临床选择方法。

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