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超声技术在颈内静脉穿刺置管术中的应用

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超声技术具有操作简便安全,显像实时直接,无创伤、可重复等优点,目前认为将超声技术应用于颈内静脉穿刺置管术中可使穿到颈内静脉的穿刺针数减少、穿刺置管时间缩短、穿刺成功率提高、并发症减少[1~3]。尤其在对肥胖和婴幼儿患者等体表标志困难、颈椎及静脉畸形、反复穿刺失败及置管困难可能造成严重并发症时使用,可使颈内静脉穿刺成功率大大提高[4~8]。本文将介绍利用超声技术指导颈内静脉穿刺置管方法,以及评价其带来的相关问题进行综述。

一、作为颈内静脉穿刺置管用的超声类型选择

临床上超声引导颈内静脉穿刺置管时采用的超声设备主要有两种类型:多普勒超声和 B 型超声(也称为实时二维超声)[7,9~11]。多普勒超声应用时,通过红细胞这个移动物体转换成一个放大的音频信号,基于动静脉血流声音的不同,实时提供声音信号帮助静脉穿刺,更能以不同颜色显示血流的方向,色泽的深浅代表血流的流速来更好地判断血管是否通畅、管腔是否狭窄、闭塞[12]。但与 B 超相比需要更长的学习时间,穿刺置管时间较长,成本上升。Schummer 等人[13]发现在两种类型的超声引导下颈内静脉一次穿刺成功率 B 超组明显优于多普勒组,尤其是在体重

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指数大于 30 的患者身上更能体现。B 超利用超声波将一个实时图像转换成灰色反射声波。血流在屏幕上显示的是黑色的低回声区,而组织以不同程度的灰色回声显示。B 超线阵探头频率一般使用 5 ~ 10MHz,这个频率能提供极佳的分辨率和足够的渗透深度[14]。

二、超声下颈内静脉定位

通常看到颈内静脉在颈动脉的前外侧或外侧位,但是,在一些解剖变异在下列情况下可以覆盖在颈动脉上方,甚至是在颈动脉内侧。Mohammadali M[15]在对 229 名成年患者双侧颈内静脉与颈总动脉解剖关系研究中发现,颈内静脉主要位于动脉的前外侧位(右侧 84%,左侧 91.8%),其次外侧位(右侧 14.2%,左侧 6.4%),前位(右侧 1.4%,左侧 1.8%),及内侧位(右侧 0%,左侧 0.5%)。同样的,Lim CL[16]与 Turba UC[17]亦发现了少量的前位及内侧位变异颈内静脉,而这些变异在婴幼儿身上更常见[18]。在实时二维超声下颈内静脉和颈动脉可以区分的,静脉可压缩,非搏动,在 Trendelenberg 位(头低脚高位)或 Valsalva 动作(深吸气后屏气,再用力做呼气动作)下静脉膨胀[19]。同时也可发现颈动脉触诊压力过大会使得颈内静脉受压,并不能使动脉远离静脉,极端向对侧头部转动可以减少颈内静脉直径,增加与颈动脉重叠,Trendelenberg 位置和正确的头位可以大大增加颈内静脉充盈程度及减少颈内动静脉重叠程度,提高穿刺成功率[20~22]。

在穿刺置管之前,可先行超声评估,以了解颈内静脉与颈动脉的重叠程度,静脉的充盈情况,以及血管内部是否有回声(判断是否有血栓存在)。如果有重大的动静脉重叠,穿刺者应设法重新调整患者头部回到中位,而不是转向对侧[20~22]。如果在可视化下静脉不可压缩或存在血栓,应考虑选择其他静脉行深静脉穿刺置管。

三、超声导引下颈内静脉穿刺方法

超声引导穿刺最常用的两种方法有“单人”或“双人”操作法。单人操作时,穿刺者一手控制超声探头,一手控制穿刺针头。也可借助于探头支架的使用。双人操作时,助手操作探头,而穿刺者控制针头和实时指导助手执行程序。单人操作的方法较双人简单易学,能提高一次穿刺成功率和总穿刺成功率[23]。

无论采用单人还是双人的方法都需将颈内静脉及颈动脉的图像在屏幕上居中。一旦选中穿刺点,遵循无菌操作原理,超声探头包裹在无菌薄膜内,外侧覆盖消毒凝胶,穿刺点常规消毒铺巾,1% 利多卡因局麻,单人操作时在进针回抽见静脉血畅通后,放下超声探头再进行接下来的穿刺步骤。在进导丝及导管时也可继续使用超声探头来观察是否在血管内。对一些静脉不够充盈的,也可以在直视下穿透后壁,再往回撤针。在面对这一类患者时,头位的摆放很重要,尽量减少动静脉的重叠,避免损伤动脉。

穿刺针进入颈内静脉的通道可以采取横向(短轴)视图或纵向(长轴)视图查看[24]。横向视图的好处在于在屏幕上可以很直接观察到静脉和动脉,以及两者位置关系和动静脉覆盖情况,尤其是那些较小的血管。纵向视图的优点在于可以更好地在视图下推进针尖,从而减少血管壁后穿孔,并能及早地探查到针头进入到血管内。正因为如此,美国急诊医师学院建议采用纵向视图操作[25]。此外,如果使用横向视图,超声探头要与针头同时推进,在这过程中对穿刺者与助手的协调性要求较高。

四、使用超声引导颈内静脉穿刺置管优缺点

在过去的几年里,超声波机器已经变得小巧便于携带。虽然不是必需的,但其很好的便携性使得这些机器非常适合于重症监护病房及手术室应用[26,27]。超声的应用,使得颈内静脉穿刺置管过程在可视化下进行,其安全性显著增高,降低了穿刺失败率及并发症的发生。及时发现患者颈部血管解剖的异常,避免了盲目多次穿刺对周围器官组织的伤害。术中可正确引导穿刺针的方向,将留置管置入恰当位置并实时判断留置管是否出现折曲。术后应用则可确定导管位置,排除部分穿刺操作并发症,为导管的安置成功及安全使用提供了有力保障。

然而,穿刺过程中操作者为避免探头与皮肤之间的间隙影响呈像效果而置探头于颈部时压力过大,或穿刺架的应用等均可使静脉受压变细,对于小婴儿的细静脉则影响更大[7]。此时在穿刺针穿破静脉前壁时有可能误伤后壁[28]。而且,现许多中心静脉穿刺仍是以解剖标志为基础,在经验丰富的操作者手中,相对成功率高,并发症少。而采用超声定位,花费增加,使用不便。此外,过于依赖超声定位将不利于年轻医师得到足够的基于解剖标志穿刺的训练。

总之,超声引导下行颈内静脉穿刺置管具有成功率高、简便、安全的优点,可缩短穿刺时间,有效防止对颈内动脉和臂丛神经的误伤,减少并发症,降低危重患者因体位不适、疾病及穿刺带来的风险,尤其对于颈短肥胖、颈部活动受限、因疾病折磨和年龄影响

而不能或不愿很好配合以及存在解剖变异的穿刺困难患者,也能迅速、准确地实施穿刺置管,减轻患者的精神负担和痛苦,具有良好的临床实用性、安全性和可靠性。

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