doi: 10.13241/j.cnki.pmb.2017.28.038

CT 联合 DR 对早期周围型肺癌的诊断价值

梁矿立[1] 李永波[1] 高彦斌[1] 李文荣[2] 李一恒[3]

(1 陕西省结核病防治院放射科 陕西 西安 710100;
2 西安交通大学第一附属医院医学影像科 陕西 西安 710061;3 西安交通大学医学部基础医学院 陕西 西安 710061)

摘要 目的:分析数字 X 线摄片(DR)、CT 及其联合应用对周围型肺癌的诊断价值。**方法:**选择该院 2012 年 2 月～2016 年 3 月收治早期周围型肺癌患者 90 例为研究对象,分别进行数字化 X 线摄影和 CT 检查,以手术切除或病理结果为最终诊断的金标准,计算两种检查方法及其联合对早期诊断周围型肺癌的敏感度、特异度和准确率阳性预测值以及阴性预测值。**结果:**胸部 DR 检出空泡征者 7 例(7.8%),分叶征 47 例(52.2%),边缘有细小毛刺征 36 例(40%),胸膜凹陷征 9 例(10%);CT 见病变边缘分叶征 71 例(78.8%),长短毛刺征 57 例(63.3%),空洞征 27 例(30%),胸膜凹陷征 32 例(35.6%)。DR 诊断周围型肺癌的敏感性、特异性及准确性分别为 85%、81%、85.6%,而 CT 则为 90%,87.6%,90.5%,均高于 DR。DR 与 CT 两者联合诊断周围型肺癌的敏感性为 98.4%,显著高于 DR(85%)和 CT(90%)。**结论:**在早期周围型肺癌的影像学诊断中,CT 的临床价值显著优于 DR,而两者联合诊断的临床价值明显优于单独检测。

关键词:周围型肺癌;数字 X 线摄片;CT

中图分类号:R734.2 **文献标识码:**A **文章编号:**1673-6273(2017)28-5565-04

The Diagnosis Value of CT Combined with Digital Radiography for the Early Peripheral Lung Cancer

LIANG Kuang-li[1], LI Yong-bo[1], GAO Yan-bin[1], LI Wen-rong[2], LI Yi-heng[3]

(1 Department of Radiology, Shaanxi Provincial Tuberculosis Control Hospital, Xi'an, Shaanxi, 710100, China;
2 Imaging Department, The First Affiliated Hospital of Xi'an Jiaotong University, Xi'an, Shaanxi, 710061, China;
3 Basic Medicine School, Faculty of Medicine, Xi,an Jiaotong University, Xi'an, Shaanxi, 710061, China)

ABSTRACT Objective: To analyze the diagnostic value of digital radiography (DR), CT and DR combined with CT for the peripheral lung cancer. **Methods:** 90 cases of patients with early peripheral lung cancer from February 2012 to March 2016 were selected as the research object. Digital radiography (DR), CT scanning were preformed in 90 cases of peripheral lung carcinoma ascertained by surgery and/or pathology. The sensibility, specificity, PPV, NPV, accuracy of DR, CT and DR combined with CT in the diagnosis of peripheral lung cancer were analyzed and compared. **Results:** 7 cases (7.8%) of vocule sign, 47 cases of lobulation (52.2%), 36 cases (40%) of the edge of a fine little prick , 9 cases (10%) of pleural indentation were found by DR detection. CT checked up the lesion edge lobulation in 71 cases (78.8%), the length of the burr syndrome in 57 cases (63.3%), empty sign 27 cases (30%), pleural cavity Depression syndrome in 32 cases (35.6%). The specificity and accuracy of DR in the diagnosis of peripheral lung cancer were 85%, 81%, 85.6%, and CT were 90%, 87.6%, 90.5%. While the sensitivity, specificity and accuracy of diagnostic CT were higher than DR. The diagnostic sensitivity of DR combined with CT was 98.4%, which was significantly higher than DR (85%) and CT (90%). **Conclusion:** The diagnostic value of CT was more excellent than DR for the early peripheral lung cancer.,while the clinical value of DR combined with CT was higher than DR and CT.

Key words: Peripheral lung cancer; Digital radiographs (DR); Computed tomography(CT)

Chinese Library Classification (CLC): R734.2 Document code: A

Article ID: 1673-6273(2017)28-5565-04

前言

肺癌是一种高发病率和高死亡率的恶性肿瘤,是全球癌症死亡的首要原因[1]。在我国, 10 种常见的癌症中,肺癌发病率和死亡率最高[2]。根据病变的不同位置,肺癌可分为中央型和周围型;周围型肺癌是指指发生于三级支气管以下,呼吸性细支气管以上的肺癌,约占所有肺癌的 60%-70%[3]。有研究表明中国肺癌患者的五年相对生存率仅为 16.1%[4], 确诊时的肿瘤分期对预后至关重要。研究表明在临床上早期周围型肺癌的症状并不明显,主要表现为轻度胸痛以及发热[5-7],很容易被潜在患者忽视,因此早期周围型肺癌的诊断十分关键。,影像学诊断目前是周围型肺癌的常用诊断方法,主要包括 CT 扫描、X 射线、核磁共振成像(MRI)、计算机断层显像(PET-CT)、胸部 X 线数字断层融合技术(CDT)[8-19]。本研究根据患者 DR、CT 等影像学临

作者简介:梁矿立(1965-),男,本科,副主任医师,研究方向:肺结核与肿瘤的影像诊断及鉴别诊断,
E-mail: liangkuangli_1965@papmedi.cn
(收稿日期:2017-06-02 接受日期:2017-06-23)

床表现并将其两两联合，探讨 DR 联合 CT 对早期周围型肺癌的诊断价值。

1 资料与方法

1.1 临床资料

纳入 2012 年 2 月～2016 年 3 月我院收治早期周围型肺癌患者 90 例,男性患者 51 例,女性患者 39 例,男性患者平均年龄在(53± 6.5)岁,女性患者平均年龄在(56± 8.5)。所有患者均经过手术及病理检查后确诊。

1.2 检查方法

90 例周围型肺癌患者均进行常规正侧位胸部数字 X 线摄片(DR),主机为 CMP200DR,成像胶片为感绿片,焦片距 180 cm,正位:10-20 mAs,侧位 30-40 mAs;CT 扫描,采用 GE 螺旋 CT 机,电压 120 kV,电流 100 mA。厚度 5 mm,(常规对病灶重建厚度 0.625mm)。检查结果由同一具有医学影像学专业技术资格证的影像学医师独立阅片,并记录各患者肺内病灶的分叶征、空泡征、毛刺征、胸膜凹陷征、细支气管充气征等影像学特征[13, 14]。

1.3 统计学方法

以手术切除或病理检查结果作为金标准。计算 DR、CT 以及两两联合的敏感性、特异性、准确性、阳性预测值及阴性预测值。数据用 SPSS9.0 处理分析，采用 ROC 曲线及 x^2 检验比较 DR、CT 或 DR 联合 CT 的诊断效能,以 P＜0.05 为差异有统计学意义。

2 结果

2.1 两种检查方法结果比较

如表 1 所示,在 90 例周围型肺癌患者中,常规正侧位胸部数字 X 线摄片(DR)检查出空泡征病患 7 例(7.8%),分叶征病患 47 例(52.2%),边缘有细小毛刺征病患 36 例(40%),胸膜凹陷征病患 9 例 (10%);CT 扫描检查出，病变边缘分叶征病患 71 例(78.8%)，长短毛刺征病患 57 例 (63.3%)，空泡征病患 27 例(30%),胸膜凹陷征病患 32 例(35.6%)。结果显示在周围型肺癌影像学诊断过程中 CT 的诊断效能显著优于 DR，且差异有统计学意义(P＜0.05) 。

表 1 两种检查方法的结果比较(例 n/%)

Table 1 Comparison of the imaging features between methods in (n/%)

Groups	Lobulation sign	Spiculate sign	Vacuole sign	Pleural Indentation sign	Bronchiolitis sign
DR	47(52.2%)	36(40%)	7 (7.8%)	9(10%)	9(10%)
CT	71(78.8%)	57(63.3%)	27(30%)	32(35.6%)	28(31.1%)
χ 2	14.172	9.811	14.504	16.708	12.281
P	0.000	0.002	0.000	0.000	0.001

2.2 DR、CT 及两者联合对周围性肺癌的诊断效能比较

胸部数字 X 线摄片 DR 诊断周围型肺癌的敏感性(Sensibility),特异性(Specificity)及准确性(Accuracy) 如表 2 所示分别为 85%、81%、85.6%,CT 扫描的结果为 90%、87.6%、90.5%。同时,不难发现无论是 CT 扫描的阳性预测值(84.7%)还是阴性预测值(93.2%)均大于 DR 诊断的阳性预测值(82.6%)还是阴性预测值(88%)。综上,CT 诊断的敏感性、特异性及准确性均高于 DR,DR 与 CT 两者联合诊断敏感性高于 DR。

表 2 DR、CT 及两者联合的诊断效能比较

Table 2 Comparisons of the diagnostic value ofDR, CT and DR for combined with CT

Methods	Sensibility	Specificity	PPV	NPV	Accuracy
DR	85%	81%	82.6%	88%	85.6%
CT	90%	87.6%	84.7%	93.2%	90.5%
DR+CT	98.4%	75.6%	80%	96.8%	87.3%

注:PPV: Positive Predictive Value; NPV: Negative Predictive Value.

3 讨论

周围型肺癌是临床常见恶性疾病,以腺癌、鳞癌多见;临床症状出现较晚,早期无浸润,无局部淋巴结转移或远端转移。有研究表明早期肺癌切除的 5 年存活率高达 70%,晚期肺癌切除的 5 年存活率仅为 10%[5]。CT 扫描是目前诊断周围型肺癌最为广泛的检测方法,扫描分辨率高,且 CT 为多层螺旋摄影,无组织结构重叠,可通过病灶重建,清晰观察肿瘤的位置以及病灶内部结构以及形态等。此外,研究表明 CT 扫描在肺癌诊断中的重复性较好,但是 CT 扫描也存在不足之处,比如检查时间长、对人体有辐射等 [20-27]。

X 射线是肺癌诊断中最基本的检查方法,目前数字 DR 摄像已慢慢取代传统 X 射线拍片，数字 DR 摄像检查时间短,对人体危害小,对早期病灶的发现有一定作用。然而,DR 分辨率低,加之组织结构重叠,难以发现较隐蔽部位病变如肺尖、心、肋膈角 [5, 17]。有研究表明重度高危的肺癌患者 DR 摄片监控不能有效降低肺癌致死率,但是可提高早期手术治疗率[28]。核磁共振成像在肺癌诊断过程中常被用于辅助诊断方法,相关文献

研究表明 MRI 常作为 CT 诊断的辅助诊断[12]。计算机断层显像(PET-CT)诊断是 CT 扫描的升级,可分层扫描摄像,但费用较高,不适合推广使用。

在本研究中,我们分析了 90 例周围型肺癌患者的常规正侧位数字 X 线摄片 (DR),CT 扫描以及 DR 联合 CT 的影像学特征,以期评价 DR 联合 CT 在周围型肺癌的诊断效率。周围型肺癌的影像学征象有分叶征,毛刺征,空泡征,支气管充气征及空洞,钙化等[6],同时在本研究中均出现空泡征,分叶征,毛刺征,胸膜凹陷征,且 CT 显著优于 DR,这与邢维明等在周围型肺癌诊断中的研究一致[29],还有史利红等在高危人群早期肺癌研究中也发现 CT 的检出率显著高于 DR[27]。同时 Xu 等在胸部 X 线与 CT 诊断周围型肺癌的对比分析研究中发现 CT 扫描在周围型肺癌诊断中征象的检出具有较高的准确性[30]。随后我们以手术切除或病理检查结果作为金标准,计算 DR,CT 以及两两联合的敏感性、特异性、准确性等,采用 x^2 检验比较 DR,CT 或 DR 联合 CT 的诊断效能,结果表明 CT 诊断的敏感性,特异性及准确性均高于 DR,DR 联合 CT 检查特异度及准确度降低,但敏感性和阴性预测值却提高,这可能与研究方法、研究人群及图像判读标准不同有关。Bezel 等在肺癌诊断研究中发现诊断结果的真阳性率与不同患者,不同肿瘤类型相关[31],同时不同的诊断方法也会影响阳性预期值[32]。

本研究中,DR 与 CT 结合检查消除了 DR 检查的弊端,比如分辨率低,过于依赖影像医师的经验,病灶观察阴影等,DR 与 CT 结合检查有效提高的诊断的敏感性,提高周围型肺癌诊断的准确性,提高周围型肺癌的确诊率为肺癌患者早期治疗提供依据,对患者的预后有着重要意义。

参 考 文 献(References)

[1] Torre L A, Bray F, Siegel R L, et al. Global cancer statistics, 2012[J]. CA Cancer J Clin, 2015, 65(2): 87-108

[2] Chen W, Zheng R, Zhang S, et al. Report of cancer incidence and mortality in China, 2010[J]. Ann Transl Med, 2014, 2(7): 61

[3] Toyokawa G, Kozuma Y, Matsubara T, et al. Radiological Features of the Surgically Resected Small-sized Small-cell Lung Cancer on Computed Tomography[J]. Anticancer Research, 2017, 37(2): 877

[4] Zeng H, Zheng R, Guo Y, et al. Cancer survival in China, 2003-2005: a population-based study[J]. Int J Cancer, 2015, 136(8): 1921-1930

[5] 李基根,符喻矗,聂世琨. 多层螺旋 CT 对 DR 体检发现的无症状孤立性肺结节的诊断价值[J]. 中国医学装备, 2015(8): 74-78
Li Ji-gen, Fu Yu-chu, Nie Shi-kun. Diagnosis Value of multi-slice CT on Asymptomatic solitary pulmonary nodules by DR examination[J]. Medical Equipment China, 2015 (8): 74-78

[6] 相丽,陆启芳,郑穗生. 周围型肺癌的 MSCT 征象与组织病理学类型相关性分析[J].安徽医学, 2016, 37(2): 163-166
Xiang Li, Lu Qi-fang, Zheng Sui-sheng. Correlation analysis of MSCT features and histopathological types of peripheral lung cancer [J]. Anhui Medical University, 2016, 37(2): 163-166

[7] 竹青. 早期周围型肺癌的影像学诊断 [J]. 临床肺科杂志, 2009, 14 (4): 508-508
Zhu Qing. Imaging diagnosis of early peripheral lung cancer [J]. Chinese Journal of clinical and pulmonary diseases, 2009, 14(4): 508 -508

[8] D Lee, S Choi, H Lee, et al. Quantitative evaluation of anatomical noise in chest digital tomosynthesis, digital radiography, and computed tomography [J]. Journal of Instrumentation, 2017, 12(04): T04006

[9] Harcke H T, Levy A D, Abbott R M, et al. Autopsy radiography: digital radiographs (DR) vs multidetector computed tomography (MDCT) in high-velocity gunshot-wound victims [J]. American Journal of Forensic Medicine & Pathology, 2007, 28(1): 13-19

[10] Ji Y C, Lee K Y, Yu A, et al. A comparison of digital tomosynthesis and chest radiography in evaluating airway lesions using computed tomography as a reference[J]. European Radiology, 2016, 26(9): 1-8

[11] Galea A, Adlan T, Gay D, et al. Comparison of Digital Tomosynthesis and Chest Radiography for the Detection of Noncalcified Pulmonary and Hilar Lesions [J]. Radiation Effects & Defects in Solids, 2015, 30(5): 328

[12] Jonas S N, Kligerman S J, Burke A P, et al. Pulmonary Valve Anatomy and Abnormalities: A Pictorial Essay of Radiography, Computed Tomography (CT), and Magnetic Resonance Imaging (MRI)[J]. Journal of Thoracic Imaging, 2016, 31(1): W4

[13] Ji Y C, Lee K Y, Yu A, et al. A comparison of digital tomosynthesis and chest radiography in evaluating airway lesions using computed tomography as a reference[J]. European Radiology, 2015, 26(9): 1-8

[14] Deppen S A, Liu E, Blume J D, et al. Safety and Efficacy of 68Ga-DOTATATE PET/CT for Diagnosis, Staging, and Treatment Management of Neuroendocrine Tumors [J]. Journal of Nuclear Medicine, 2016, 57(5): 708-714

[15] Fagman E, Van E M, Fredé n L J, et al. (18)F-FDG PET/CT in the diagnosis of prosthetic valve endocarditis [J]. International Journal of Cardiovascular Imaging, 2016, 32(4): 679-686

[16] Chrapko B E, Chrapko M, Nocuń A, et al. Role of 18F-FDG PET/CT in the diagnosis of inflammatory and infectious vascular disease[J]. Nuclear Medicine Review Central & Eastern Europe, 2016, 19(1): 28

[17] 徐伟凌,张军. DR 与常规 X 线摄影在脊柱结核临床诊断中的应用及价值对比[J].中国医学创新, 2016, (2): 58-60
Xu Wei-ling, Zhang Jun. Application and Value Comparison of DR and Conventional X-ray Photography in the Clinical Diagnosis of Spinal Tuberculosis[J]. Medical Innovation of China, 2016, (2): 58-60

[18] Hans G, Johannes W, Andreas H, et al. Image and diagnosis quality of X-ray image transmission via cell phone camera: a project study evaluating quality and reliability[J]. Plos One, 2012, 7(10): e43402

[19] Awai K, Murao K, Ozawa A, et al. Pulmonary nodules: estimation of malignancy at thin-section helical CT--effect of computer-aided diagnosis on performance of radiologists[J]. Radiology, 2016, 239(1): 276-84

[20] Pompe E, de Jong P A, Lynch D A, et al. Computed tomographic findings in subjects who died from respiratory disease in the National Lung Screening Trial [J]. European Respiratory Journal, 2017, 49(4): 1601814

[21] James L P, Zhao B, Moskowitz C S, et al. Reproducibility of computed tomography (CT) measurements of lung cancer[J]. Journal of Clinical Oncology, 2008, 26(15): 431-436

[22] Haaf K T, Tammemägi M C, Bondy S J, et al. Performance and

Cost-Effectiveness of Computed Tomography Lung Cancer Screening Scenarios in a Population-Based Setting: A Microsimulation Modeling Analysis in Ontario, Canada [J]. Plos Medicine, 2017, 14 (2): e1002225

[23] Kim T J, Lee C T, Jheon S H, et al. Radiologic Characteristics of Surgically Resected Non-Small Cell Lung Cancer With ALK Rearrangement or EGFR Mutations [J]. Annals of Thoracic Surgery, 2016, 101(2): 473

[24] Glaudemans A W, de Vries E F, Galli F, et al. The use of (18)F-FDG-PET/CT for diagnosis and treatment monitoring of inflammatory and infectious diseases [J]. Clinical & Developmental Immunology, 2013 (2013): 623036

[25] 董志坚, 齐敏, 师卫华,等. 中央型肺癌的 CT 增强扫描诊断及价值分析[J].实用癌症杂志, 2017, 32(3): 477-478
Dong Zhi-jian, Qi Min, Shi Wei-hua, et al. CT enhanced scan diagnosis and value analysis of central lung cancer [J]. Chinese Journal of practical cancer, 2017, 32(3): 477-478

[26] 王建雄, 吴彩玲, 窦晓霞,等. 分析胸部 DR 和低剂量螺旋 CT 扫描在 82 例肺癌筛选中的使用价值[J]. 影像技术, 2015, 12(3): 34-35
Wang Jian-xiong, Wu Cai-ling, Dou Xiao-xia, et al. Analysis of the value of chest DR and low-dose spiral CT scanning in the screening of 82 cases of lung cancer[J]. Image Technique, 2015, 12(3): 34-35

[27] 史利红. 64 排螺旋 CT 低剂量在高危人群早期肺癌筛查和诊断中的应用价值[J].国际呼吸杂志, 2016, 36(4): 258-261
Shi Li-hong. 64 slice spiral CT low dose in high risk population screening and early diagnosis of lung cancer in the application value [J]. International Journal of respiratory, 2016, 36 (4): 258-261

[28] 李永忠. 胸部数字化 X 线摄影与低剂量螺旋 CT 在肺癌筛查中的应用价值[J]. 中国慢性病预防与控制, 2015, 23(6): 463-464
Li Yong-zhong. Chest digital radiography and low dose spiral CT in the screening of lung cancer [J]. Chinese Journal of Chronic Disease Prevention and Control, 2015, 23(6): 463-464

[29] 邢维明,左玉强,贾丽萍,等.孤立结节型肺隐球菌病与周围型肺癌的 CT 比较[J].齐鲁医学杂志, 2016, 31(02): 152-154, 158
Xing Wei-ming, Zuo Yuqiang, Jia Li-ping, et al. Isolated pulmonary cryptococcosis and peripheral lung cancer: a comparsion in CT finding[J]. Medical Journal of Qilu, 2016, 31(02): 152-154, 158

[30] 徐萍. 胸部 X 线与 CT 诊断周围型肺癌的对比分析[J].世界最新医学信息文摘:连续型电子期刊, 2016, 16(40): 128-128
Xu Ping. Comparative analysis of chest X ray and CT diagnosis of peripheral lung cancer [J]. World News Digest: serial electronic journals, 2016, 16(40): 128-128

[31] Bezel P, Tischler V, Robinson C, et al. Diagnostic Value of Bronchoalveolar Lavage for Diagnosis of Suspected Peripheral Lung Cancer[J]. Clinical Lung Cancer, 2016, 17(5): e151-e156

[32] 詹翔. 早期周围型肺癌的 CT 影像学分析 [J]. 医药卫生: 全文版, 2016, 2(9): 00012-00012
Zhan Xiang. CT Imaging analysis of early peripheral lung cancer [J]. Medical and Health: full text, 2016, 2(9): 00012-00012

(上接第 5560 页)

[11] Sun J, Dou W, Shen H, et al. A comparison of the effects of nifedipine,verapamil, and low-molecular-weight heparin on SLIGRL-NH_2-induced calcium influx through proteinase-activated receptor 2 activation[J]. Pharmacology, 2014, 93(5-6): 216-219

[12] Song K, Yao Y, Rong Z, et al. The preoperative incidence of deep vein thrombosis (DVT) and its correlation with postoperative DVT in patients undergoing elective surgery for femoral neck fractures [J]. Arch Orthop Trauma Surg, 2016, 136(10): 1459-1464

[13] Luria S, Eylon S, Peyser A. Vascular Aneurysm Secondary to a Femoral Intertrochanteric Fracture Concealed by Anticoagulation Therapy[J]. Isr Med Assoc J, 2015, 17(12): 777-779

[14] Liu M, Liu L, Huang F, et al. Perioperative treatment of femoral neck fracture with deep venous thrombosis: A case report [J]. Chin J Traumatol, 2015, 18(2): 109-112

[15] Song JQ, Xuan LZ, Wu W, et al. Low molecular weight heparin once versus twice for thromboprophylaxis following esophagectomy:a randomised, double-blind and placebo-controlled trial [J]. J Thorac Dis,2015, 7(7): 1158-1164

[16] Russo M, Malekzadeh AS, Hampton C, et al. Reversed Contralateral LISS Plate for Vancouver B1 Periprosthetic Femoral Shaft Fractures [J]. Orthopedics, 2015, 38(6): e467-e472

[17] 王海立,孙家元,张弢,等.低分子肝素预防骨盆髋臼骨折后下肢深静脉血栓的临床研究[J].中华实验外科杂志, 2016, 33(8): 2054-2056
Wang Hai-li, Sun Jia-yuan, Zhang Tao, et al. Clinical study of low molecular weight heparin in preventing deep venous thrombosis after pelvic and acetabular fractures [J]. Chinese Journal of experimental surgery, 2016, 33(8): 2054-2056

[18] Cho YH, Byun YS, Jeong DG, et al. Preoperative Incidence of Deep Vein Thrombosis after Hip Fractures in Korean[J]. Clin Orthop Surg, 2015, 7(3): 298-302

[19] Li Q, Yu Z, Wang J, Chen X, et al. Long-term prognostic analysis of early interventional therapy for lower extremity deep venous thrombosis[J]. Exp Ther Med, 2016, 12(6): 3545-3548

[20] Lanitis T, Leipold R, Hamilton M, et al. Cost-effectiveness of apixaban versus low molecular weight heparin/vitamin k antagonist for the treatment of venous thromboembolism and the prevention of recurrences[J]. BMC Health Serv Res, 2017, 17(1): 74

[21] Cheng W, Dahmani FZ, Zhang J, et al. Anti-angiogenic activity and antitumor efficacy of amphiphilic twin drug from ursolic acid and low molecular weight heparin[J]. Nanotechnology, 2017, 28(7): 075102