

胸部 X 线平片上各解剖结构 相对遮盖面积测定的研究

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提 要 在胸部 X 线平片上肋骨、心影、锁骨等和肺组织重叠,严重的影响了肺部疾病的诊断,本研究使用电子计算机通过对各遮盖面积的精确测定,得出肺野有 62% 被肋骨遮盖;心影和肺重叠区占肺野面积的 17.1%。肺野共有 79.1% 的面积被各种结构遮盖。所以,适度地降低肋骨的遮盖是提高胸片信息量的重要途径。

关键词 胸部 X 线平片 质量保证 肺野遮盖面积测定

胸部 X 线摄影是临床放射诊断中最常用的检查方法,可占临床放射检查的 50%。富含气体的肺组织使肺组织各部分之间及纵隔和周围组织对 X 线的吸收有较大差别,在 X 线胶片上能产生对比良好的影像,为呼吸系统疾病的 X 线诊断提供了极为有利的条件。但因周围组织及纵隔等和肺组织重叠,使位于这些部位的病变显示差,有时形成病变显示的“盲区”⁽¹⁾。本研究通过对胸片上各遮盖结构面积的精确测量,为进一步评价胸片及改进胸片质量打下了基础。

材料和方法

1. 胸片来源: (1) 选自浙江省平阳矾矿国产机摄片试验⁽²⁾所得的 271 张后前位胸片中的 253 张,余 18 张因查体、转诊等原因留矿 11 张,有 7 位患者因非技术原因摄片两张,只能算一份。(2) 本所高、低电压胸部摄影所

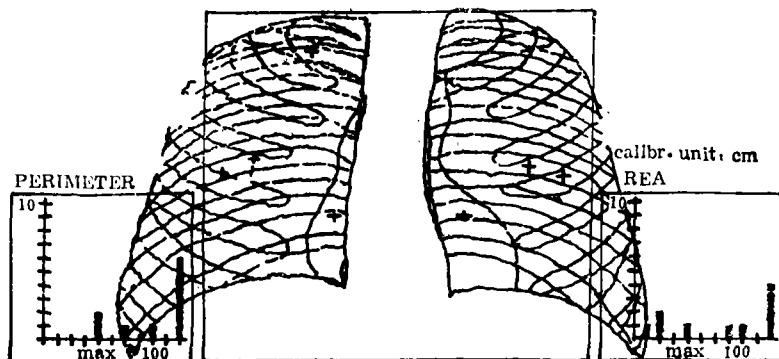
得具有可比性的 86 份胸片。摄片均用 180cm 的焦一片距。

2. 设备: ASM 68K 电子计算机图像分析系统(ERNST-LEITZ-WETZLAR 程序)。

3. 将所摄胸片置于读片灯箱上,在绘图纸上描出以下 6 个部分轮廓的外缘线,备测。肺和心影重叠部的部分界线不易识别,在描记时设定右侧肺以胸椎右沿为界,左侧肺以降主动脉左外沿为界。(1) 两侧肺(L); (2) 两侧锁骨(C); (3) 心影重叠的肺(H); (4) 后肋重叠的肺(P); (5) 前肋重叠的肺(A); (6) 前后肋重叠的肺(D)。

4. 将描出的轮廓图置于电子计算机图像处理仪下,测出以上六个部位的面积。下图为 GB 标准片 0⁺ 的各部位测定示意图。

5. 对少数(5 张)胸片上缺肋膈角的,可沿侧胸壁及膈肌的走形补齐。



ASM 68K 电子计算机胸片遮盖面积测定示意图

结 果

表1示浙江平阳矾矿国产机摄片试验的253张胸片和北京地区86张胸片各部位面积测定结果。从结果可以看出,除两侧肺面积绝对值外,各遮盖结构的面积两组间无显著差异(P 值均大于0.05)。

将两组胸片面积测定结果合并(结果见表

表1 平阳矾矿253张胸片(I)、北京地区86张胸片(II)上各结构对肺野遮盖面积(cm^2)

	两 侧 肺		两 侧 锁 骨		心 影		后 肋		前 肋		双 肋 重 叠
	I	II	I	II	I	II	I	II	I	II	I
例 数	253	86	253	86	253	86	253	86	253	86	27
均 值	437.9	473.4	19.1	20.5	73.8	69.3	204.3	210.3	135.8	141.2	66.6
百分比			4.5	4.4	16.9	14.8	46.7	44.5	31.0	29.8	15.2
标准差	61.6	70.0	7.8	3.4	12.5	12.5	68.5	30.6	25.0	26.5	28.5
t	4.48		1.196		0.324		0.785		1.701		
P	<0.001		0.20	<P<0.30	0.70	<P<0.80	0.40	<P<0.50	0.05	<P<0.10	

表2 两组合并后各结构对肺野遮盖面积(cm^2)

	例数	均值	占肺野面积百分比
两 侧 肺	339	446.7	
两 侧 锁 骨	339	19.5	4.4
心 影	339	76.5	17.1
后 肋	339	205.8	46.1
前 肋	339	137.2	30.8
双肋重叠	27	66.6	14.9

在胸部后前位片上,除前后肋骨有较大面积的重叠外,锁骨和肋骨、肋骨和心影也有重叠,后二者重叠面积较小,个体差异较大,测定计算较困难。为求简便,本文用心影和肋骨遮盖面积之和作为肺被遮盖面积的近似值。

讨 论

胸部X线平片上影像显示的是多层次解剖结构重叠投影的二维图形,故显示的各解剖结构交叉、重叠,使得(1)纵隔、心影部的影像密度值多在X线胶片特性曲线的“趾部”,与之相重叠的肺组织失去对比,影像显示很差;(2)在骨质吸收X线较多,影像密度较低条件下与肋骨重叠的肺结构影像难以显示;(3)各结构的交叉、重叠还破坏了影像

2)可以看出以后肋对肺野的遮盖面积最大,占肺野面积的近一半,其次依次为前肋、心影和锁骨。前后肋交叉遮盖肺野面积也较大,占14.9%;肺野面积被肋骨遮盖(前肋面积+后肋面积-双肋重叠面积)62%。锁骨遮盖肺野面积的4.4%;肋骨、心影共遮盖肺面积的79.1%(肋骨遮盖面积+心影遮盖面积)。

的连贯性和轮廓延续,减低了人对影像的视觉分辨能力^[3,4]。在临床上大量的假阴性、假阳性诊断主要是由于各结构重叠、交叉所造成。各家对各结构遮盖量进行了估价,但因缺乏实用、准确的测量方法,估算结果差别很大。如肋骨对肺的遮盖面积测估的变化从25%到70%^[5]。

肋骨是遮盖肺野最主要的结构,本文测定结果和国内放射技术专家估计的占肺野面积60%相近^[6]。但后肋遮盖肺野面积46.1%的结果要比以前人们估计的高,且后肋在低电压胸片上影像密度较低,重叠下的肺部影像显示很差,所以在低电压胸片上后肋严重影响肺部影像显示。锁骨、心影对肺野的遮盖面积相对较小(分别占肺野面积的4.4%和17.1%),但这些部位是一些肺部疾病的好发区,对疾病诊断的影响也较大。

以上各结构共遮盖肺野面积的79.1%,其中遮盖较重的后肋、锁骨、心影也占肺面积的60%以上。读低电压胸片犹如在肋骨的缝隙中来观察肺部结构的改变,必然影响肺部结构的显示。在尘肺诊断中应用低电压胸片也必然影响尘肺细微结构改变的观察。可见适度降低

对比度,减轻重叠组织阴影的遮盖程度是提高胸片信息显示量的重要途径^[1]。

本研究共测胸片 339 张,地处中国南北两地的两个样本所得结果相近,说明结果能较好的代表中国人胸片上肺被遮盖的情况。

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尘肺小阴影钙化两例报告

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尘肺改变的X线影像,可概括地分为类圆形小阴影和不规则形小阴影。类圆形小阴影的影像密度中等,均匀,边缘锐利,钙化非常少见,现将我们遇到的两例报告如下。

【例1】男,52岁,接尘工龄七年零五个月。体检:一般情况稍差,有咳嗽,胸痛,活动后气促;无盗汗,潮热;血压、血像正常。职业史:1960年6月至1963年8月某水电站石工(手工作业);1963年9月至1967年12月某电站风钻工(干式作业)。

X线胸片所见:1971年11月胸片,两中上四个肺区出现q型类圆形小阴影,密集度1级,部分小阴影中心密度较高,边缘锐利,肺门密度增高,淋巴结钙化,心影大小正常。诊断为I期矽肺。1977年3月胸片,类圆形小阴影数量增多,达2级密集度,分布范围扩大到六个肺区,两上肺区的小阴影增大,密度较前增高,相当于肋骨密度,两下肺出现肺气肿,诊断为II期矽肺。1984年4月胸片,右上肺区的类圆形小阴影聚集靠拢,两中上四个肺区的类圆形小阴影明显增大,为r型,密度显著增高,超过后肋骨密度,肺气肿加深,两肺无结核X线征像,诊断为II期矽肺并钙化。

【例2】男,53岁,接尘工龄13年。体检:胸痛、气促,咳嗽、吐痰;无盗汗、潮热;血压正常。职业史:1950~1952年某锡矿山井运工(干式作业),1953~1957年风钻工(干式作业)。1958~

1964年某汞矿风钻工(湿式作业)。

X线胸片所见:1957年胸片,两肺门阴影增大,密度增高,两肺出现一些非典型类圆形及不规则影,右上肺尖有结核硬结灶。心影大小正常,诊断为可疑矽肺。1963年胸片,六个肺区出现1级密集度的q型类圆形小阴影,诊断为I期矽肺。1967年胸片:类圆形小阴影较前明显增多,达2级密集度,两上肺区小阴影聚集靠拢,部分中心出现钙化,肺门亦有壳样钙化,两下肺气肿,肺结核无变化,诊断为II期矽肺。1970年胸片,类圆形小阴影除大部分密度增高钙化外,肺门壳样钙化明显增大,肺气肿稍加深,肺动脉段稍隆起,诊断为II期矽肺并大部分钙化,早期肺心病。1979年胸片,类圆形小阴影全部钙化。

讨论:在尘肺诊断中,肺门淋巴结钙化常见,而尘肺小阴影钙化很少见,本两例首先在类圆形小阴影的中心开始密度增高,随着时间的推移,密度逐渐增高并钙化。有人认为:矽肺“结节”钙化应出现在接触原子量高的矿物尘,如铁、钨等作业工人,而本文两例患者都是接触岩尘,主要是含游离二氧化硅。尘肺小阴影钙化系钙盐沉积所致,类圆形小阴影开始出现时密度中等,而后出现中心密度增高,最后整个结节密度均匀增高以致钙化。尘肺小阴影钙化多发在矽肺病的中晚期,一旦钙化后,未见矽肺进展,不易融合。尘肺小阴影钙化是否象结核钙化灶一样,意味着病变稳定,不再发展,有待探讨。

Abstracts of Original Articles

Study on Pulmonary Function and Arterial Blood gas Analysis in Silicotic Patients

Shi Zhicheng, et al

The pulmonary function and arterial blood gas analysis of 77 silicotic patients and 33 workers exposed to silicotic dust (control group) were measured. The results showed that the mean values of VC, FVC, FEV₁, MMF, FEV₁/FVC in silicotic patients group were lower than those in control group. The ventilatory function in silicotic patients group was decreased progressively, but it was not obvious in early stage. \dot{V}_{10} and \dot{V}_{12} were greatly decreased in all category of silicotic patients. The dominant impairment in silicotic patients of category I was of obstructive pattern, but the mixed pattern was found mostly in silicotic patients of category II.

RV and RV/TLC were significantly increased in silicotic patients of category II. DL_{co} and K_{co} in silicotic patients group were lower than those of control group. The arterial blood gas analysis showed that the decrease of PaO₂ and SatO₂ mostly found in silicotic patients of category I, II. One-Third of patients in category II had both hypoxemia and hypercapnia. In conclusion we consider that FEV₁, FEV₁/FVC, VC, FVC, MMF, DL_{co}, K_{co} are sensitive indices which could demonstrate early changes of lung function in silicotic patients, the arterial blood gas analysis have important referential value for disease status and prognosis of silicotic patients.

Key words, pulmonary function, arterial blood gas analysis, ventilatory function, hypoxemia, hypercapnia

A Study of Occupational Epidemiology on the Hazards of Element

Mercury

Fu Weizu, et al

In this study, the relationship between element mercury (Hg) and its hazards was discussed and current hygienic standard of Hg was reevaluated using methods of occupational epidemiology. The subjects investigated were 1220 mercury exposed workers (including 776 females) and 944 controls (including 592 females). The investigation showed that the sequel symptoms were correlated with mercury exposure level, urine mercury (Hg-U), length of working, and age, when at air concentration of below 0.1 mg/m³, and that the neurasthenia symptoms in female workers were more severe than in male workers. There was dose-effect relationship between airborne mercury (Hg-A), Hg-U and intoxicant symptoms. The ratio of Hg-A to Hg-U is 1:1.67, that is, the Hg-U level below 0.05 mg/L was commensurated with the air exposure level of 0.03 mg/m³. Given mercury exposure below this level continuous for 10 years, the incidence of mercurialism was 1.9%. This provides the principle of preventing 97% mercury exposed population from mercurialism. The author suggests to revise the value of current hygienic standard for Hg in our country from 0.01 mg/m³ to 0.03 mg/m³.

Key words, element mercury, hazards of element mercury, dose-effect relationship, hygienic standard

Measurement of Area of Overlying Structure in Chest Radiograph

Sun Chengye, et al

Areas of overlying structure were measured with electronic computer of ASM 68k in 339 chest radiographs which were selected

from two areas obtained from both south and north China. The results showed that 79.1% of area of pulmonary parenchyma were obscured by bone (rib and clavicle) and heart totally.

Key words, chest radiographs quality assurance area of overlying structure

Measurements of Human Exposure to Whole-Body Vibration and its Effects on the Health in the Vehicles

Wang Lin, et al

The vibration parameters in the tractor driver's for 8 types of trucks and tractors were measured and analyzed so as to make hygienic evaluation. The whole-body vibration level in all vehicles overran the "exposure limit" recommended by ISO 2631-1985, especially marked for the Shanghai type 50 tractor and Jiefang 4 T tip truck. Four hundred and ninety drivers of the vehicles were checked medically, including electrocardiogram (ECG) visual-motion response time (VMRT) and spinal column X-ray examinations, and compared with control group of 162 office workers. Results showed that back pain, hypertension, abnormality of ECG rhythm, slowness of VMRT and hypertrophic change of the lumbar vertebrae were common findings in these drivers. These changes increased with increase of duration of the driver's job. It is neces-

sary to study further for the effects of whole-body vibration and combined factors on human health. It is necessary also to formulate the criteria and control method about whole-body vibration in the vehicles.

Key words, whole-body vibration visual-motion response time X-ray change in spine column

Potential Years of Working Time Lost and Its Comparative Studies

Fu Zhenying

According to principal of potential years of life lost for calculating potential years of working time lost on occupational workers. We make use of the ratio potential years of working time lost. The average of working time lost and the index of working time lost to evaluate the level of seriousness of the occupational hazard. Therefore we can cover the shortage of the number of exposing workers and to solve the problem in calculating the prevalence rate of working time. This also can give a reliable index in preventing and evaluating the economical loss in occupational diseases.

Key words, potential years of life lost potential years of working time lost ratio of potential years of working time lost average of working time lost index of working time lost

激素局部封闭致死1例报告

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患者,女,42岁,1991年3~6月因右前臂背侧肿瘤在当地用醋酸确炎舒松-A注射液局部封闭,共20支(计1000mg)。突然停药后,7月10日来我院,经门诊检查,12日以前臂多发性脓肿收入院。

查体: T39.2°C, P98次/分, R30次/分, BP14/10kpa, 神志恍惚, 言语迟钝, 表情淡漠, 听力减退。满月脸, 胡须男性化, 前额发际区有脓疱, 双颊内有小块溃疡, 腰部有散在出血点。心音纯, 节律整, 心率98次/分。双肺湿罗音, 腹部膨隆, 肝区压痛(+), 移动性浊音(+). 双下肢浮肿, 右前臂明显肿胀, 皮温高, 有

3处5×4cm隆起包块, 波动感(++), 触痛(++).

入院后即给先锋霉素V 6.0g/日静滴, 13日下午病人持续高热T39.6°C, 血压下降至10.2/8.4kPa, 右前臂穿刺出大量稀薄脓汁, 全院会诊, 诊断为右前臂化脓性感染, 脓毒败血症并感染性休克, 急性肾上腺皮质功能不全伴危象, 即给氢化可的松 300mg/日、氯化钾 6.0g/日, 输血400ml, 纠正水电解质紊乱。因考虑到病人处于休克状态未做脓肿切开。14日上午休克无好转, 即在病室行切开引流术, 引出脓汁400多毫升, 下午病情继续恶化, 经积极抢救无效于23点10分死亡。