THE MUTUAL MOBILITY BETWEEN THE SKIN AND DEEPER STRUCTURES, AND ITS RELATION TO BULLET WOUNDS.

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The following observations will demonstrate the impossibility of determining, from the position of the skin wounds alone, what deeper structures have been either hit or missed by a bullet in its transit through the body. It is necessary to call attention to three points:

(1) That the skin moves normally over deeper structures. This movement of the skin is more marked in some parts than in others. The range of the skin’s movement is most marked about the scapula behind, and the folds of the axilla in front. In the accompanying photograph two black points can be seen—A and B. A was the fixed point and B was a mark on the skin. When the arm was in the normal anatomical position, the two marks, A and B, were opposite one another; but when the arm was raised above the head, as shown in the illustration, the mark on the skin B moved upwards from the fixed point A about five inches. No movement of the trunk was allowed. It can be easily appreciated that if a bullet were to hit a man at B with his arm raised, the skin at B would be lowered to the position A when his arm was lowered, and hence give rise to the erroneous impression that the thorax was penetrated at A, when really the thorax would have been entered at B. The nipple moves upwards about one and a half to two inches when the arm is raised. The mobility of the skin in these regions may explain many otherwise inexplicable escapes of the heart in bullet wounds of the chest. Again, a man whilst in the act of “raising his eyebrows” might be hit by a bullet which entered the base of his skull and injured his brain. When the skin resumed its normal position the wound would be lowered half an inch to an inch, so that an examining surgeon would be led to hope that the brain had escaped, whereas, in reality, the man was probably fatally wounded.

(2) That the deeper parts normally move under the overlying skin, which, although stretched, may remain more or less stationary. To demonstrate this fact, make an ink mark on the skin covering the centre of the patella when the man is standing upright in the normal position. Then make the man bend his knee to the limit.
of flexion, and observe the relation of the patella to the ink mark; the bone will be seen to have moved so far downwards that the mark does not cover it at all. Hence it may be said that if a man’s leg were hit by a bullet at this point when his knee was completely flexed his patella would escape, although it would appear when his leg was straightened that the patella and centre of the joint must have been penetrated. The same kind of experiment can be demonstrated in the region of the olecranon process; and the iliac crest
can be shown to move beneath the skin by tilting the pelvis well upwards or downwards. The abdominal viscera can also be demonstrated to move within the abdominal cavity. To open the abdomen of a patient in the Trendelenberg position is perhaps the best way of showing the capacity of the small intestines to leave Douglas' pouch and occupy higher regions. A man wounded through the pelvis, when in a corresponding position, might escape injury to his small intestines. In fact, at Modder River, during the Boer War, I had under my care a young soldier who had been wounded through the pelvis as he was crawling down the river bank at Paardeberg in the act of getting water. His rectum was penetrated and faeces had escaped into the lower part of his abdominal cavity. The probability is, that his small intestines would have escaped injury even if the bullet had directly traversed Douglas' pouch, because he was practically in the Trendelenberg position.

(3) That when the skin is fixed by a belt, strap, or by a man leaning against a hard object, the underlying parts move about beneath the skin so fixed. It seems to me it must be admitted on all hands that the only way to discover what are the viscera struck by a bullet is to search for them by a direct post-mortem examination, and practically to regard the positions of the skin wounds as data liable to lead to error. The mobility of the skin over more or less fixed deeper structures, and the subcutaneous mobility of the deeper structures beneath a more or less fixed skin, renders valueless any observations of this kind that are based upon the position of skin wounds.

I was led into these experiments after a criticism by Surgeon-General W. F. Stevenson, C.B., which was made upon a case I ventured to publish in the Journal of the Royal Army Medical Corps, January, 1905, in which he based his attack upon the positions of the skin wounds, and imagined that on those grounds alone he could cast doubt upon a careful post-mortem examination made by myself and others.