How does the Humes autopsy report holograph on its page 7 effect this? He does not refer to it. It was changed night of 11/22/63 & see Post-mortem

What Struck John

Reinterpretation of the Medical Evidence in the Assassination of John Kennedy

Presented to ASK '94 by Joseph N. Riley, Ph.D., November 20, 1994

"From the beginning, all was clear as daylight."
- Zen aphorism

Summary of Conclusions

1. Official Story is demonstrably false

- The exit wound is not located where the HSCA says it is. The HSCA description *directly contradicts* it's own evidence. The exit wound is located just posterior to bregma (point where the sagittal suture meets the coronal suture)

- There is no entrance wound where the HSCA locates it. This is confirmed by correct interpretation of the X-rays. The autopsy photographs *show* intact cerebral cortex at the point that the HSCA claims is an entrance wound.

2. Most significant error is misinterpretation of the geometrical relationship between the frontal and lateral X-rays.

- Until now, the frontal X-ray has been interpreted to be at a 23.6 degree angle relative to the face (the so-called "modified Waters" interpretation). This is demonstrably false.

- The frontal X-ray was taken almost directly perpendicular to the face (within 3 degrees). *All empirical tests and the remaining autopsy evidence is consistent with this interpretation.*

3. When the correct relationship between the X-rays is appreciated, what emerges is a clear, coherent, and consistent description of John Kennedy's head wounds. John Kennedy was struck in the head by two bullets, one from the right front and one from the rear.

First wound	Second wound
from the right front	from the rear
(corresponding to Z313)	(*may* correspond to shot at Z327)
entrance wound located approximately 6 cm below vertex, approximately 4.8 cm lateral to midline.	entrance wound located close to the original description of Humes et al.
exit wound (semi-circular beveled notch) located posterior to bregma, near midline.	major fragment terminated in right supraorbital ridge.
responsible for cortical damage and metal fragments in outer parts of brain.	responsible for pattern of subcortical damage.

The autopsy evidence, when interpreted correctly, provides an empirical proof that John Kennedy was killed by more than one assassin.

Delimitation

- This presentation is restricted to consideration of the head wounds.
- The working assumption is that the autopsy evidence is authentic.
- The presentation is based solely on empirical arguments.

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I. Overview

The faults and failures of the autopsy are well known.
They are largely a distraction.
Questions of authenticity are an even greater distraction.

The Official Story is in an untenable position; damage control is the best that can be done.

Catch-22 (part 1): The Warren Commission stated that the autopsy findings supported the single gunman conclusion. Subsequent panels asserted that the findings were in error. Therefore, either the Warren Commission was intellectually sloppy or intellectually dishonest. This is true regardless of what subsequent panels determine.

Catch-22 (part 2): Regardless of intent, subsequent panels must disagree with the original description or invalidate the Warren Commission findings. The opportunities for reconstructing reality are limited by the evidence. The argument for a "high" entrance wound is fatally flawed and demonstrably false. No external arguments are required; the OS/2 description is contradicted by the evidence accepted by the panels. It is stupid.

Damage control has been exceptionally good.

- The essential point that emerges is simple enough. In previous interpretations, the location of all the important information in the X-rays (bullet fragments, defects, etc.) is based on the belief that the frontal X-ray was taken at a 23 degree angle relative to the face. It is not. The locations are wrong and, therefore, the interpretations are wrong.. The reconstruction will be hopelessly flawed.

- The arguments presented here involve anatomical terms and technical jargon, but the arguments are based on *geometrical* and *logical* relationships, not on neuroanatomical or radiological subtleties. A mathematical model of an abstract box would work just as well. There is, however, the problem of a psychological barrier: how could something so fundamental have been overlooked? The barrier to appreciating and understanding the fundamental flaws is psychological, not logical.

- If the arguments listed above are valid, there is literally a new picture of the medical evidence. What emerges is a clear and consistent interpretation of all the evidence -- not just the X-rays.

The following briefly touches on some key elements in the reinterpretation.

- The pattern of *brain damage* is inconsistent with a single bullet. The cavitation wound (a "cylinder of disruption" caused by the passage of a bullet) is *linear*. There is no evidence of continuity between the cavitation wound and the fragments in the right dorsolateral (upper right hand side) cortex. To use a crude analogy, if we cut an apple in half along the core and remove the core from one side of the apple, the part of the core that was removed resembles the location and size of the cavitation wound. In the HSCA trajectory, the bullet path is restricted to the outer (cortical) surface, almost tangent to the brain. Yet there is a cavitation wound along the length of the brain, deep and parallel to the cortical surface. The argument that the cavitation wound was produced by non-specific damage is illogical.

- The cavitation wound corresponds exactly to a trajectory predicted from the observations of the autopsy prosectors. When the X-rays are re-interpreted:

    - There are clear signs of an entrance wound where it was described by the prosectors.

    - In the OS interpretation, the large circular fragment on the frontal X-ray corresponds to a thin "slice" of bullet that somehow slid down the back of the skull; in the reinterpretation, the large

circular profile in the frontal X-ray corresponds *exactly* to a fragment in the lateral X-ray that is embedded in the right supraorbital ridge (above the right eye).

- When a line is drawn from the original entrance wound described by Humes et al. to the fragment in the right supraorbital ridge, this line corresponds exactly to the cavitation wound.

- To understand the appearance of the brain requires a fair amount of neuroanatomy. In short, one would predict that destruction of the structures along the cavitation would result in an "outfolding" of the right side of the brain. The "destruction" seen in the drawing of the brain is due to this outfolding; the cortical surface is not seen.

    - Anatomical landmarks seen on the drawing are consistent with this interpretation.

    - Consistent with the reinterpretation, the fixed brain weight is inconsistent with major loss of tissue. The apparent destruction is really disruption.

- The HSCA analysis is flawed to a degree that is difficult to appreciate:

- Entrance wound

    - When the X-rays are re-interpreted, there is no indication of a "high" entrance wound. (Indeed, even in the OS interpretation, there is no indication of a "high" entrance wound.)

    - The impression of "cowlick" in the photograph of the entrance wound in the scalp is simply that, an impression for which there is no empirical evidence. When objective measurements (including those provided by the HSCA) are made, the scalp wound is located near where it was described initially by Humes et al.

    - In the "top of head" autopsy photographs, intact cerebral cortex is visible. (This has been confirmed in personal communications from Dr. Robert Artwohl and Dr. David Mantik, both of whom visited the archives. What is unappreciated is that this cortex (superior parietal lobule) *corresponds to the HSCA's entrance site*.

- Exit wound

    - There are logical *contradictions* in the HSCA's location of the exit wound.

    - The exit wound *cannot* be where the HSCA places it. Proper interpretation of photograph F8 shows the exit wound to be located just posterior to bregma (bregma is the point where the coronal suture intersects the sagittal suture).

    - When the region just posterior to bregma is examined in the X-rays, the configuration is completely consistent with the shape of the semi-circular skull defect.

    - When the X-rays are examined, the trail of cortical fragments leads from the exit defect to the front right side of the head. On both the frontal and the lateral X-rays, there is a clear indications of skull disruption at these points and the alignment between the frontal and lateral points is exact.

II. Fundamental Flaws in the Official Story

There are a number of mistakes and flaws in the report of the House Select Committee on Assassinations (HSCA) Forensics Panel (referred to subsequently as Panel) such as invoking neurological reflexes (decerbrate rigidity in the cat) that do not exist in primates. What has not been

appreciated is that there are a number of *errors of fact* in the Report. The Report contains blatant errors that invalidate the Official Story

A. The Exit Wound

The errors of fact and interpretation of the exit wound are sufficient to invalidate the Official Story. The topic is technical, but what emerges is simple enough: the Panel contradicts its own evidence in its description of the exit wound. We address a single contradiction involving the triangular skull fragment. There are a number of other contradictions, but the number does not matter. The contradiction in the Panel's description of the triangular fragment is sufficient to make the Panel's analysis invalid.

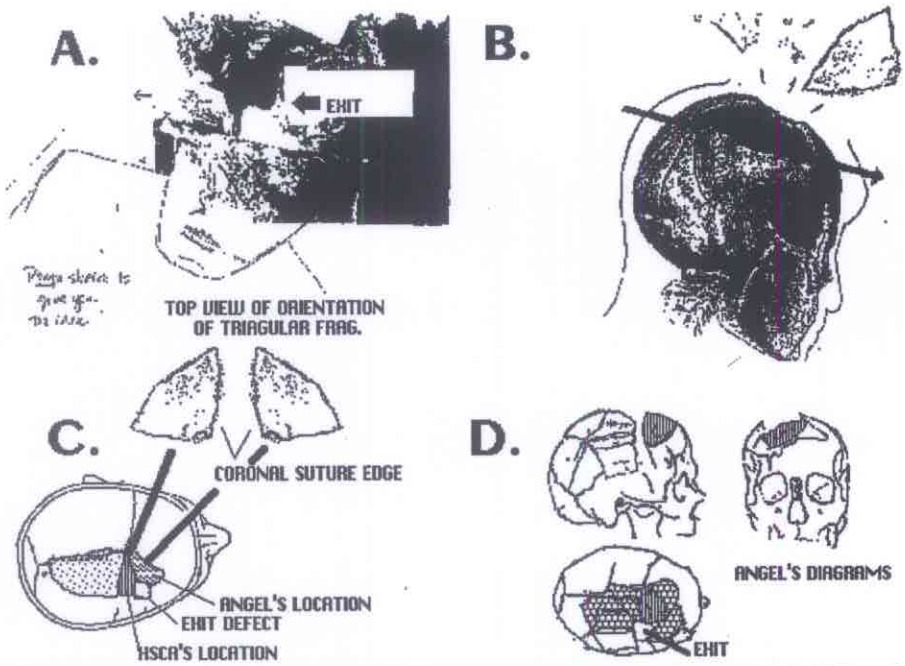


Figure Legend **A.** HSCA interpretation of F8. (Sketch provided by Robert Artwohl, M.D. -- the figure is for general orientation and should not be overinterpreted). **B.** HSCA's drawing of the skull damage and associated skull fragments; note that the skull fragments are not drawn at the same scale as the skull. **C.** Diagrammatic representation of the general orientation of triangular fragment in HSCA interpretation and Dr. Angel's interpretation. The point is not the exact location but that the *HSCA interpretation requires that the triangular fragment be parietal bone*. **D.** Dr. Angel's drawings with graphic enhancement to emphasize triangular fragment.

The Panel locates the exit wound on the frontal right-hand side of the head at the level of the coronal suture, just above Stephanion (Fig. 1A, 1B). The evidence supporting this location, as it is interpreted by the Panel, is as follows:

First, the exit wound itself is a semi-circular defect in the skull; the margins of this defect are beveled outward . Both the shape and beveling of the defect are consistent with an exit wound. Accepting this defect as an exit wound, the question is, where is this defect located?

Second, the defect is clearly defined in a series of autopsy photographs, collectively referred to as the Group 5 photographs (see Fig. 1A). The location of the exit wound depends, then, on how the Panel interprets the Group 5 photographs.

Third, the Panel examined X-rays and photographs of recovered skull fragments. A large triangular fragment was examined at the time of autopsy; one tip of the triangular piece indicated outward beveling and metallic fragments were seen in the X-rays at this location. In addition, one edge of the triangular fragment was along the coronal suture. Both the prosectors and the Panel believed that this tip formed part of the exit defect. A second (larger) fragment, the "Harper" fragment, was not available at autopsy. The Panel report states that the Harper fragment completes the exit wound.

There is a contradiction in the Panel's description of the exit wound and the Panel's interpretation of the triangular fragment . This fragment was described by Dr. Angel as "clearly frontal" [and for good reason], the Panel accepts that the coronal suture is located along one edge of the fragment, and at no point does the Panel record any objection to the characterization of the triangular piece as frontal bone. However, if the posterior edge of the triangular fragment is coronal suture (as it is in Dr. Angel's diagram), the Panel's interpretation of F8 is invalid, since the frontal bone must be intact in the Panel's interpretation of F8. ***The Panel's resolution of this conflict is indefensible and inexcusable: in order to preserve it's interpretation of F8, the Panel report "flips" over the triangular piece and makes it parietal bone (see Fig. 1C).*** The characteristics that led Dr. Angel to characterize it as "clearly frontal" are convincing, but if that were not enough, there simply isn't enough space for the triangular piece to fit into the parietal area; more disturbing, however, there is no rationale given in the report nor acknowledgment that the triangular fragment is now interpreted as parietal bone.

The conclusion is simple: the Panel's analysis of the exit wound is invalid and depends upon a systematic misrepresentation of the Panel's own data. That the conclusions of the panel are invalid does not, by itself, provide the final answer to how John Kennedy was killed.

B. The Entrance Wound

There are two versions of the Official Story.

Official Story version 1 (OS/1): the autopsy prosectors locate the entrance wound 2.5 centimeters lateral and slightly above the external occipital protuberance.

Official Story version 2 (OS/2): beginning with the Clark Panel, the entrance wound is located approximately 10 cm from the OS/1 position.

There is more to this than you might guess.

The *significance* of that change in location is not appreciated.

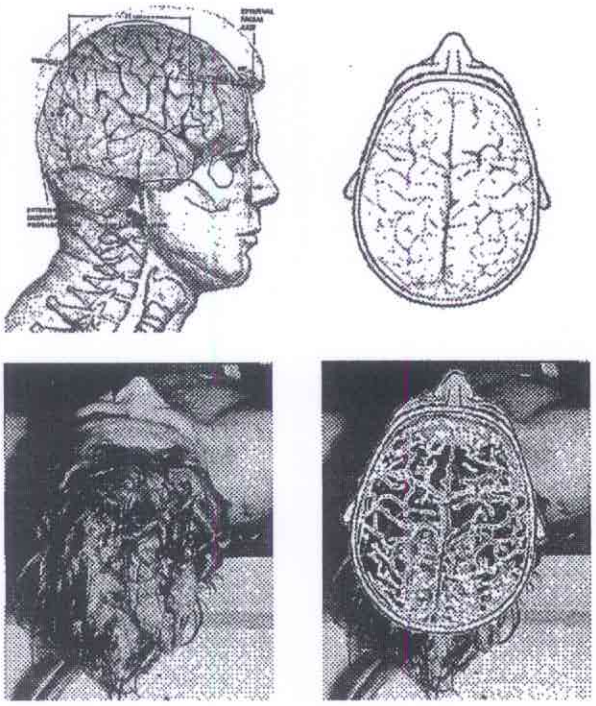
As we shall see, the issue is not competence or precision of measurement; the "entrance wound" in OS/2 is not and cannot be the entrance wound that was described in OS/1.

The dispute over the location of the entrance wound is not due to an obsession with precision; at risk is the central thesis of the Warren Report.

If the original description by Humes et al. is correct, more than one bullet struck John Kennedy in the head. This is inescapable. The problem for the Official Story is obvious.

The degree to which this may have influenced subsequent panels is not a scientific question.

Consider the *impossibility* of the HSCA description based simply on what is before our eyes:



II. Interpretation of the X-rays

A reinterpretation of the medical evidence involves a great deal more than a new interpretation of the X-rays. However, the reinterpretation proposed here begins with a reassessment of the X-rays and how they have been interpreted. The essential difference between interpretations begins with defining the geometrical relationship between the frontal and the lateral X-rays. What emerges is literally a new picture of the medical evidence.

A. Definitions and preliminary considerations

X-rays, like photographs, are two-dimensional images of three-dimensional space. Standard nomenclature is to refer to an X-ray according to the plane (two dimensional) image captured by the X-ray. Of the three possible planes, only two are relevant here since only these two are part of the autopsy evidence. They are: (1) the *lateral* plane (the image is of the side of the head and the plane is parallel to the side of the head; (2) the *frontal* plane (the image is of the front of the head. Adding confusion, the frontal X-ray is also called an AP X-ray (referring to it being taken from Anterior (front of head) to Posterior (back of head)). The two planes are illustrated below:

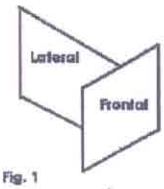
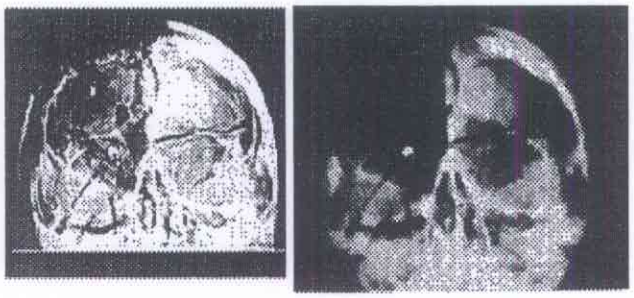


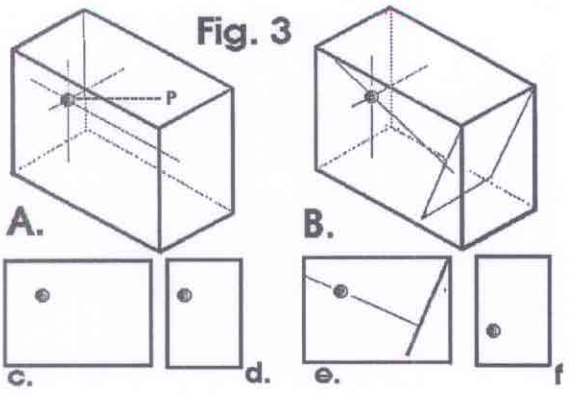
Fig. 1

There are two post-assassination X-rays of John Kennedy's head that have been published, one lateral and one frontal. (There are two lateral X-rays -- one taken from the right and one taken from the left side of the head -- in the National Archives. Only one -- taken from the right -- has been published.) The HSCA had both X-rays enhanced by computer image processing. The lateral X-rays are identical in the areas they show; however, the frontal X-rays are different in height (y-axis will be used to refer to "height" at times). Both the "enhanced" and "unenhanced" frontal X-rays are used to illustrate certain points; this difference in height explains why the frontal X-ray image looks different in some illustrations. Also, since reproduction of these images is difficult, at times I have used a "negative image" (done by computer processing, not hand drawing) to illustrate certain points.. The two frontal X-rays are illustrated below:



The phrase "interpretation of the X-rays" has two meanings.

In the broadest sense, "interpretation of the X-rays" refers to the reconstruction of a three dimensional image based on the two dimensional images. As shown in Fig. 3, if A and B represent the true three dimensional location of point P, it is possible to reconstruct an accurate image using a pair of X-rays taken at any angle *provided the relative angles of the X-rays is known.* X-rays C & D, taken at right angles to each other, make it easy to translate point P's location into three dimensional space. X-rays E & F are not taken at right angles, but still locate point P at the same location as C&D.



The second use of the phrase "interpretation of the X-rays" refers to defining the relationship between a pair of X-rays (relative angles) that are used to construct a three-dimensional image. As shown in Fig. 4, if this relationship is not determined correctly, the three-dimensional reconstruction is invalid. For example, if pairs C & D are assumed to be at right angles to each other, the location of point P remains the same. However, if pair E & F should be misinterpreted as being at right angles to each other, the reconstruction in B will be different than in A. It is this problem, defining the relationship between the frontal and lateral X-rays, that is central to reinterpreting the evidence. By analogy, what will be shown is that significant images on the X-rays (location of bullet fragments, bone defects, etc.) *are not located where they have been thought to be.*

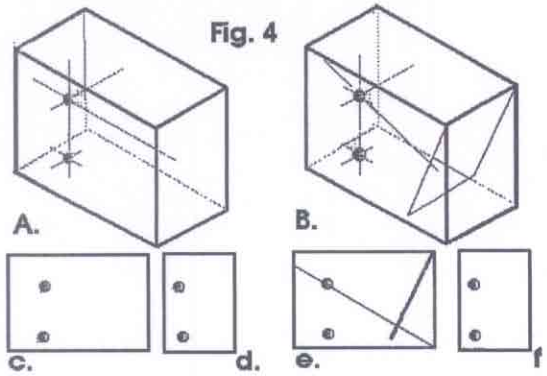


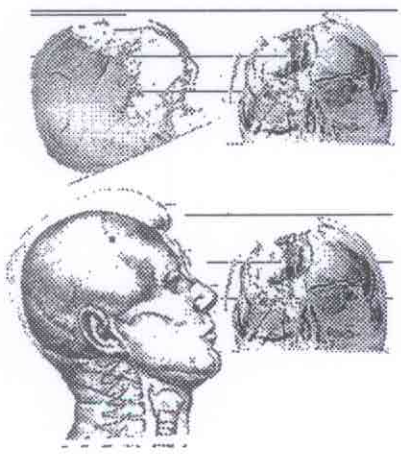
Fig. 4

Note that in e. and f., one point in each will not be localized.

B. Standard Interpretation of the X-rays

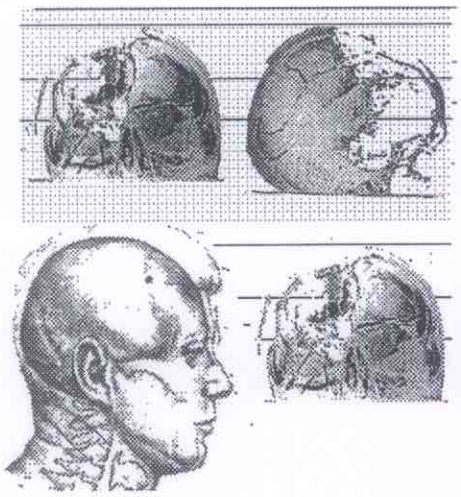
The OS interpretation of the frontal X-ray is that it's taken at a 23 degree (approximate) angle relative to the lateral X-ray. In other words, the OS view is that the frontal X-ray was taken at a 23 degree angle relative to the face. This relationship is illustrated below:

When the lateral and frontal X-rays are aligned according to this relationship, there is a relatively good match between a number of anatomical features, as well as "corresponding" fragments. To illustrate this relationship:



The angled projection (often referred to as a "modified Waters" view -- a Waters projection is even more angled and used in radiology to examine sinuses etc.) gives a reasonably good match between anatomical features, though there are discrepancies. The discrepancies are attributed to technical factors (such as magnification in the projections etc.) but have never been analyzed in detail.

C. New Interpretation



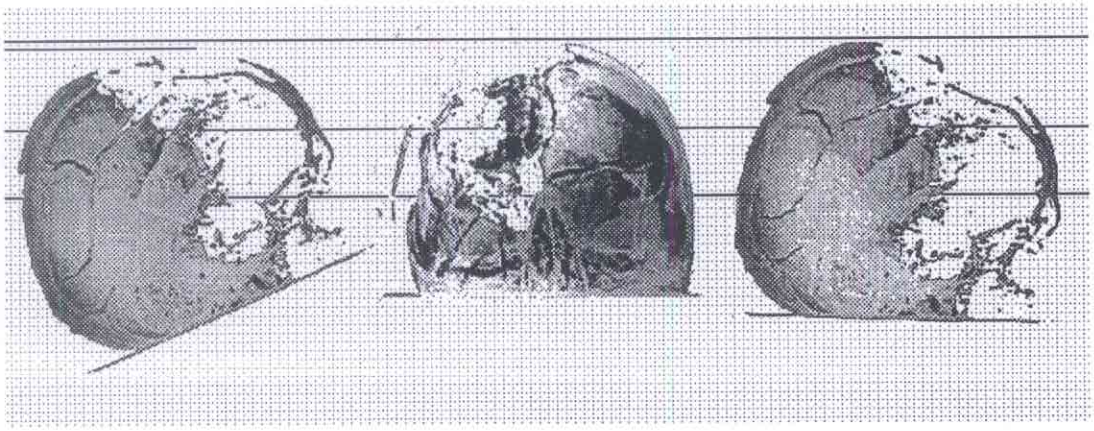
To an anatomist, it is quite clear that the frontal X-ray was taken "face-on" rather than at an angle. If the frontal X-ray is face-on, then there must be a good match between anatomical features on the frontal and the lateral X-ray -- at least as good a match as for the OS view. This is shown below:

What will be clear is that this interpretation also matches anatomical landmarks extremely well. And there is an excellent match between the location of various bullet fragments, just as with the OS interpretation. However, *the corresponding fragments are reversed*. The significance of this reversal will become apparent.

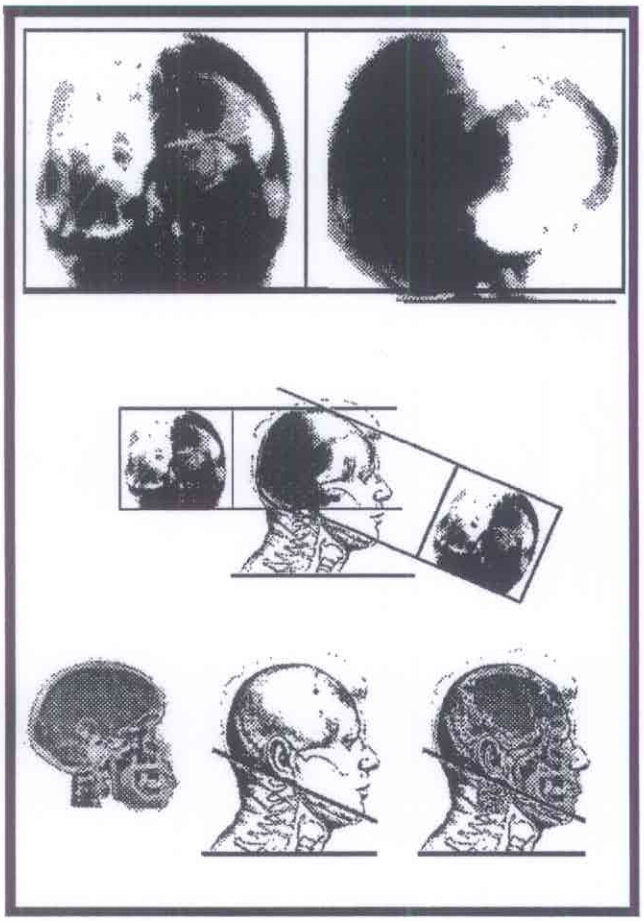
D. Comparison of Interpretations

We can compare the two interpretations in the following figure:

Both interpretations match a wide variety of anatomical features (both A and C compare well with B). Although there are subtle differences that uniformly favor the "front on" view, the technical considerations get to be very complicated; they will not be discussed. However, it's relatively easy to determine by comparing what the two images predict.



We can align the two X-rays at the top (obviously the top of one image must correspond to the top of the other). Also, we can measure the height (y-axis) of the frontal X-ray:



We now have a relatively easy way to compare the two interpretations. The two interpretations predict distinctly different images for the AP X-ray. The two interpretations predict different "heights" (y-axis values) for corresponding structures on the frontal X-ray. What makes interpretation even easier is that the two interpretations also differ in predicting what structures will be imaged on the AP X-ray. So, all we have to do is compare the predicted images to the actual image.

When we compare predictions to the actual image, the OS interpretation simply falls apart. Although there are a number of inconsistencies in corresponding locations in the predicted and actual images, perhaps the easiest and least ambiguous difference to understand is the teeth (see D and E). The OS interpretation predicts that the teeth will be visualized on the AP image; they are not. (The X-ray was published with the lower portion of the X-ray cut off; the teeth are visualized on the film, but at a point *below* the cropped X-ray.) The AP image is, however, completely consistent with the new interpretation.

To further illustrate the point, the figure below shows a normal lateral X-ray superimposed on the HSCA's drawing of John Kennedy's head. If the frontal X-ray was taken at a 23 degree angle relative to the face, *the teeth must captured on the image* but they are not.

[There are a number of additional arguments, all of which support this reinterpretation. Since they get rather technical, they will be excluded for now. Additional arguments include:

On the frontal X-ray, the coronal suture is located below vertex at the location predicted by the reinterpretation. In the OS interpretation, the X-ray beam is essentially tangent to the coronal suture and the coronal suture should not be imaged.

On the frontal X-ray, the lamboid suture is located in the region of the lower orbit, entirely consistent with the reinterpretation. It cannot be located in this region if the OS interpretation were correct.]

The geometrical relationship between the lateral and frontal X-rays has been discussed in detail previously. As noted previously, there are two possible interpretations of the geometrical relationship between the frontal and lateral X-rays.

IV. Synthesis

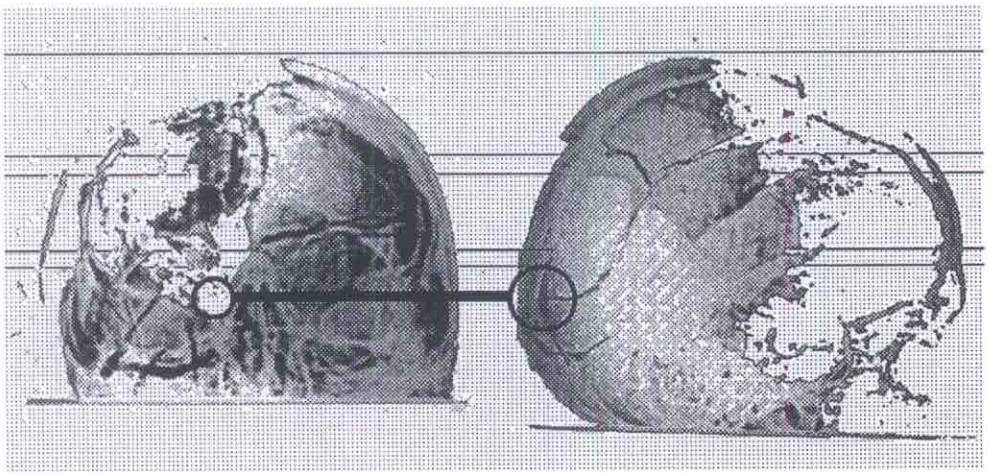
Shot From the Rear

In the autopsy report, the rear entrance wound was located "2.5 cm to the right and slightly above the external occipital protuberance." The Clark Panel, HSCA forensics panel, etc., located the entrance wound approximately 10 cm (four inches) above this location. The prosectors continued to insist that the entrance wound was near the external occipital protuberance. The HSCA forensics panel report noted:

(308) The panel continued to be concerned about the persistent disparity between its findings and those of the autopsy pathologists and the rigid tenacity with which the prosectors maintained that the entrance wound was at or near the external occipital protuberance

The evidence confirms the location of the rear entrance wound described in the autopsy report. The X-rays (when interpreted correctly), description of brain damage, and photographs of the entrance wound in the scalp are all consistent with this location.

1. The X-rays are consistent with a shot from the rear.

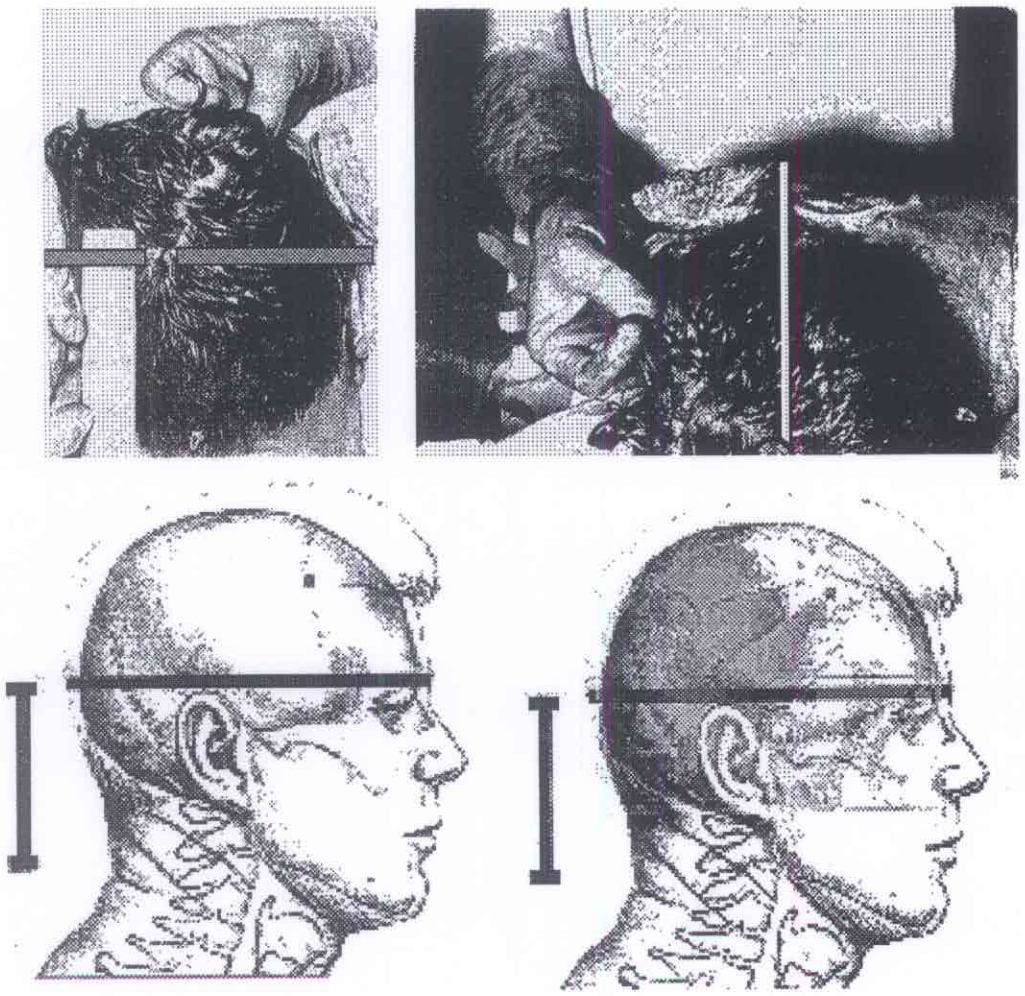


1. The photograph of the scalp wound is consistent with this location.

The HSCA forensics panel provided an illustration of the back of the head showing the wound in the scalp (first figure, far left) and contended that this illustrated a wound in the "cowlick" area. There are numerous problems with this contention (see Riley, 1992). The single sole objective measurement provided by the HSCA is that the wound was located 13 cm from the first prominent crease in the neck. There are numerous problems with this description (e.g., how can it be 13 cm from the base of the neck and 10 cm above the external occipital protuberance?). However, when 13 cm is measured on a scale drawing (bottom, far left; bar represents 13 cm), the scalp wound is not located even remotely close to the "high" entrance wound. *When this location is compared to the X-rays, it corresponds exactly to the point identified above* (bottom, far right).

[To those familiar with the esoterica of interpreting the medical evidence, attempts to preserve a half-way rational interpretation of the drawing (top, left) by invoking head tilt simply don't wash. Among numerous factors, the impression of head tilt is due largely by the orientation of the drawing. It appears to show the head being held up. However, it is clear from additional information in corresponding photographs that the head is not being held up; it is turned to the side. There are numerous other factors that support this argument, but important points include: (a) the photograph is completely consistent with

the reinterpretation and (b) if the "official" interpretation of the X-rays is not valid, there is no high entrance wound.] The photograph of the scalp wound is consistent with this location.



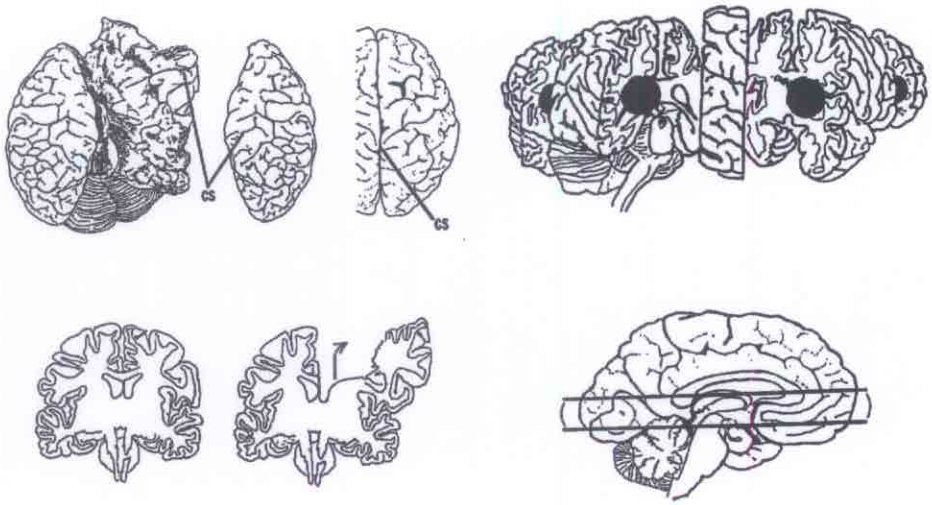
3. The pattern of brain damage.

The described brain damage is entirely consistent with a path from this entrance site to the fragment in the right supraorbital ridge. (This is something of a heavy load unless you know a bit about neuroanatomy.)

The brain damage is described in the supplemental autopsy report as:

> Following formalin fixation the brain weighs 1500 grams. The right cerebral hemisphere is found to be markedly disrupted. There is longitudinal laceration of the right hemisphere which is a parasagittal in position approximately 2.5 centimeters to the right of the midline which extends from the tip of the occipital lobe posteriorly to the tip of the frontal lobe anteriorly. The base of the laceration is situated approximately 4.5 centimeters below the vertex in the white matter. There is considerable loss of cortical substance above the base of the laceration, particularly in the parietal lobe. The margins of this laceration are at all points jagged and irregular, with additional lacerations extending in varying directions and for varying distances from the main laceration. In addition, there is a laceration of the corpus callosum extending from the genu to the tail. Exposed in this latter laceration are the interiors of the right lateral and third ventricles. When viewed from the vertex the left cerebral hemisphere is intact. There is marked engorgement of meningeal blood vessels of the left temporal and frontal regions with considerable associated subarachnoid hemorrhage. The gyri sulci over the left hemisphere are of essentially normal size and distribution. Those on the right are too fragmented and distorted for satisfactory description. When viewed from the basilar aspect the disruption of the right cortex is again obvious. There is a longitudinal laceration of the midbrain through the floor of the third ventricle just behind the optic chiasm and mammillary bodies. This laceration partially communicates with an oblique 1.5 centimeter tear through the left cerebral peduncle.

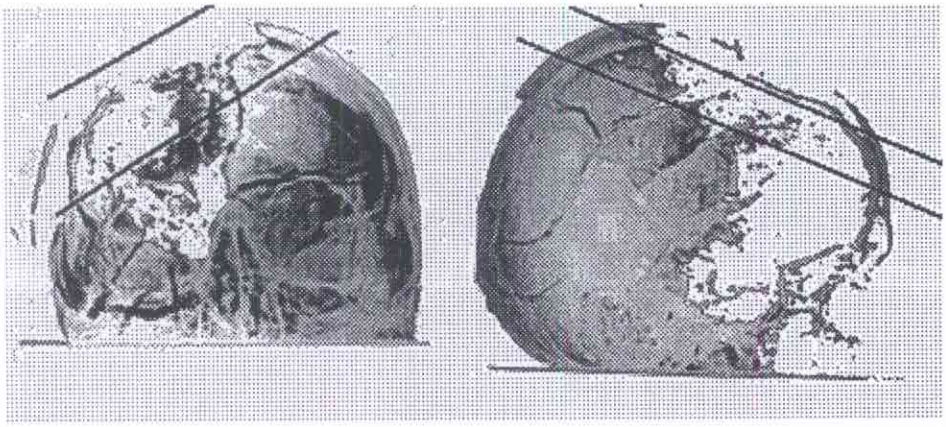
All of the damage described by the HSCA falls along a line consistent with an entrance wound illustrated in point 1 and terminating in the right surpraorbital ridge.



Shot from the Front

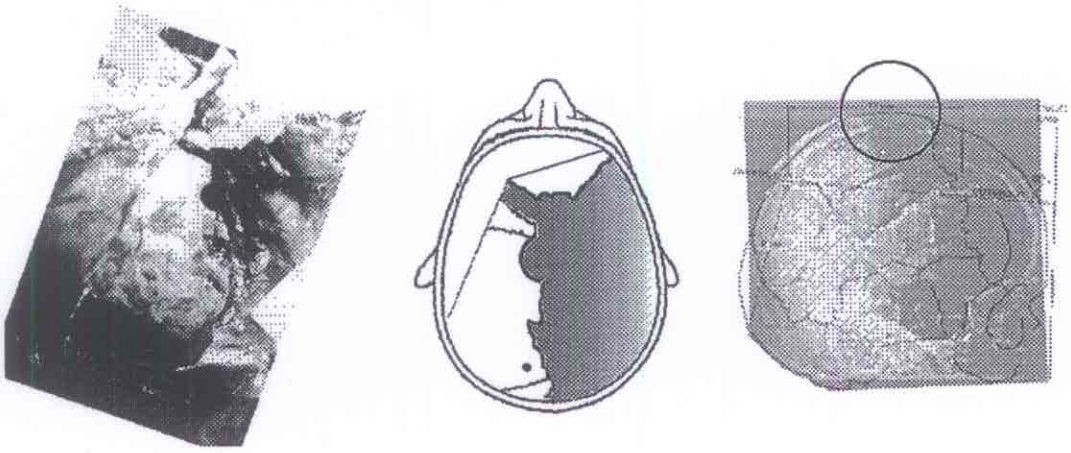
If the rear entrance wound is located where Humes et al. described it, it proves a second shot to the head. The fragments distributed in and the damage to the cerebral cortex cannot be due to the shot described by Humes et al.; the wounds are discontinuous. The reasons for this are described in detail in Riley (1992). What follows briefly illustrates that the evidence confirms a second shot and that this shot is from the right front.

The distribution of fragments approximates the path of the second shot.



A semi-circular skull defect has been identified as part of an exit wound. The location of this defect depends upon the interpretation of the autopsy photographs. The interpretations to date (by the Clark Panel and the HSCA forensics panel) are in error. These interpretations fail to appreciate basic neuroanatomical relationships (unfortunately, there was no neuroanatomist on either panel -- parietal foramina alone are enough to orient the photographs), are contradictory, and ignore the obvious (it would be irresponsible and stupid to try to remove the brain if so much skull were left, as it must be in the official interpretations of the photographs). The correct interpretation of the photographs and the location of the exit defect are illustrated below. The exit site is located just posterior to bregma (the point where the sagittal suture meets the coronal suture). The X-rays and photographs are consistent with each other.

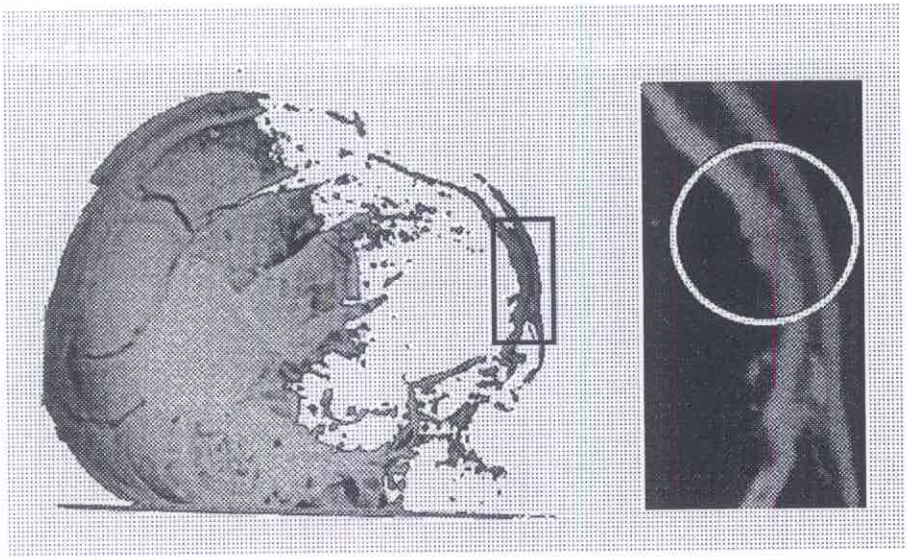
Location of the Exit Defect

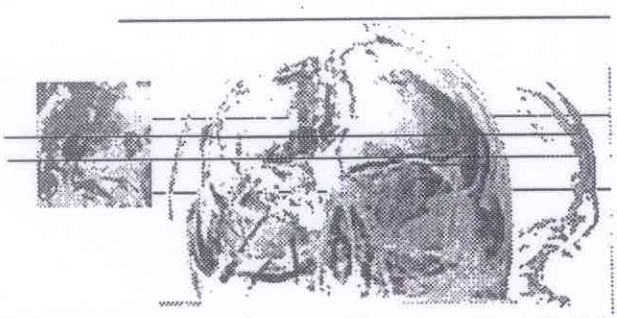


A semi-circular skull defect has been identified as part of an exit wound. The location of this defect depends upon the interpretation of the autopsy photographs. The interpretations are due to a misunderstanding of basic anatomical relationships. The proper interpretation of the photographs and the location of the exit defect are illustrated below. The exit site is located just posterior to bregma (the point where the sagittal suture meets the coronal suture). The X-rays and photographs are consistent with each other.

Entrance Wound for Shot from Front

The entrance wound must be located near the other end of the trail of fragments. On the lateral X-ray, there is a clear indication of disrupted skull at the appropriate vertical position. (Keep in mind that in cross-section, both intact skull and disrupted skull are superimposed upon each other.)





Comparison of lateral X-ray and frontal X-ray. The location of the entrance wound on the AP X-ray requires a rather detailed and technical description of the X-rays (for example, the disruption illustrated above indicates a lateral location; this has to do with the three dimensional structure of the skull and the fact that the disruption does not extend to the "front" of the skull). It also involves factors that cannot be resolved through empirical measurements, such as the possible disruption of the image by Ebersole's holes. However, the corresponding location (corresponding on y-axis and at the "origin" of the metalic fragments) on the frontal X-ray is identical to the "small semicircular notch 35mm above the right orbit" described by Dr. Angel.

Conclusions

The conclusions are obvious enough, but only one really matters: the evidence proves that John Kennedy was struck in the head by more than one bullet. We're all aware of what that means.

Since there are so many technical terms and complicated arguments, it's easy to be distracted by single arguments and obscure issues, but please consider:

1. There simply can be no doubt that the X-rays have been misinterpreted. At the very least, a new and open-minded examination of the medical evidence is required.

2. When the orientation of the X-rays is understood, what emerges is quite remarkable: there is a clear and coherent explanation of the evidence. This reinterpretation is both consistent with the medical evidence and with other evidence (e.g., the Zapruder film). In short, it all fits.