Terminal ballistic

Terminal ballistic deals with behavior of the missile (projectile) once it hits the target. Terminal ballistic is the study of penetration of missile in deferent types of target such as solids as well as liquids. It is the study of wounding capabilities in animal tissues. It involves the studies of bullet resistance materials such as jackets and vests. The study involves penetration of bullets in making holes in glass panes in windows, showcases and buildings. The target may be soil, brick or wood.

If the target is human body, the Terminal Ballistics may be called Wound Ballistics. This is an important aspect of terminal ballistics since; deferent parts of human body react differently to similar caliber missile with same velocity. Broadly speaking terminal ballistics sub- divided into penetration potential which is the capability of a missile to penetrate various material and wound ballistics which is the effect the missile has on living tissues.

Concept of Wound Ballistics

Wound ballistics basic concepts there are three concepts generally held by most as to the effect of a bullet striking a human being. The bullet dampens its way through having a small entry hole and equally sized exit hole. Another concept is that if someone is shot by any firearm (other than air rifle) the impact would be sufficient to leave him off his feet to fly through the air. None of the above is a correct concept and is incorrect in one way or the other.
One of the reason is that the bullet when passing through human tissue will impact will consume some or all of its kinetic energy to the surrounding tissue resulting in throwing the tissue away from the bullets path in a radial manner leaving a temporary wound cavity which has much large diameter than the diameter of the bullet. The temporary nature of this cavity results from the natural elasticity of the human skin which regains its original structure after the bullet has passed.

There is also a permanent cavity resulting from the destruction of tissue caused by the bullet itself. The permanent cavity is dependent on the cross sectional area of the bullet and any secondary missiles produced due to break up the bullet during its passage.
Temporary cavity has a very short life span as the name indicate and is followed by a number of aftershocks decreasing in severely. The final, permanent cavity may be many times greater than the diameter of the missile, but is also many times smaller than the temporary cavity. Unlike the temporary cavity, where the tissue is merely being thrown away from the wound track and no permanent damage is being caused to the tissue. The permanent cavity is caused by the actual destruction of the tissue by the passage of the bullets. The dimensions of the temporary cavity are dependent upon the shape, weight, size and velocity of the projectile as well as the elasticity of the surrounding structures.

Target Site

A human body is not a uniform medium. It has about 80% water. The water is not uniformly distributed. At some places there are bones, at other places, veins, nerves, muscles or blood vessels. Thus the vulnerability is unevenly distributed. The minimum velocity required to penetrate the skin is about 40-50 meters per second. This is known as Threshold Velocity. Its value for bone penetration is 60 meters per second. Wounding effect of a projectile will depend upon:

- The target site whether it is front side or back side of the body. The head injury would differ from the wound found on the waist.
- The velocity of the projectile.
- The constructional features.
- The range of firing. A contact injury would obviously be different from a distant shot injury.

Identification of Entry Wound

Identification of entry wound can be done by the presence of partially burnt propellant in the wound and blood & tissue in or upon the barrel of the weapon will correctly identify the wound as an entry rather than an exit wound. Another identifying factor is the presence of deep cruciform tearing around the wound called Stellate tearing.

Factors influencing the wounding capability

Immediately after leaving the barrel, the bullet is in a slightly unstable condition which is due, in the main, to three factors: ‘yaw’, ‘precession’ and ‘nutation’.

1. Yaw

Yaw can be described as the angle between the longitudinal axis of a projectile and its line of flight as exists before the bullet achieves full gyroscopic stability.

2. Precession

This is the rotational effect of the bullet is about its mid axis.

3. Nutation

This is the progressive corkscrew motion of the bullet. This action is very similar to the wobble observed immediately after a top or gyroscope is initially set spinning and is a function of the spin rate being too great.