# OH, SEW EASY: UNDERSTANDING SUTURE MATERIALS

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Suture selection is a crucial and integral factor to ensuring successful surgical outcomes. Suture material choices must be based on the anticipated wound healing times and tissue types as well as considerations unique to each patient (e.g., age, weight, overall health status, presence of infection.)[1] Since many sutures are subject to either absorption, encapsulation or rejection, using the wrong suture type may lead to unintended consequences such as wound dehiscence or the development of draining fistulous tracts. Veterinary technicians well versed in suture types and selection criteria will be more adept at anticipating the needs of the surgeon.

**What is a Suture?**

The word 'suture' is used to describe strands of material used to ligate (tie off) blood vessels or approximate tissues during wound closure. Written Egyptian and Syrian references describing the use of strings and animal sinew as sutures have been discovered as far back as 2,000 B.C. Throughout history, the evolution of suturing materials for operative procedures have included the use of silk, linen, cotton, horsehair, animal tendons and intestines, and wire made from precious metals. In fact, some of these materials as well as the surgical methods used by the Roman emperors' physicians are still in use today. Modern advancements include the development of easy-to-use sutures designed for specific surgical procedures that can also help decrease the potential for postoperative infections. [2]

**Ideal Suture Characteristics**

General suture performance may be divided into 3 areas: 1) physical characteristics, 2) handling characteristics, and 3) biological properties.[1] Consequently, the perfect suture would be made of strong, inert materials that resisted shrinking and breaking until completely serving its purpose. It would also have minimal 'memory' properties, thereby rendering the suture easy to handle while maintaining good knot security. The perfect suture would also be nontoxic, non-electrolytic, non-capillary, non-allergenic, non-carcinogenic, and avoid bacterial growth. [2,3,4] Other beneficial properties of the ideal suture would employ the use of readily available and inexpensive materials, ability to withstand the sterilization process without alteration, and would be manufactured securely attached to strong, sharp needles that easily and rapidly penetrate tissues.[3]

**Surgical Needles and Needleholders**

Surgical needles are made of high quality stainless steel alloys that resist corrosion. They are available in a wide variety of shapes and sizes, but there is no standardized sizing system or nomenclature available for them.[2,4] The length, diameter, and curvature of a needle can influence the surgeon's ability to place the suture material. Since one of the primary goals in needle selection is to minimize tissue trauma, the needle should be as slim as possible while not compromising strength. Therefore, the needle-body diameter should ideally match the suture

size. For example, swaged (attached) needles will pass more efficiently through tissues than reusable manually threaded needles.
Needle shapes vary widely and may be straight, half-curved, or any portion of a circle (3/8 circle, 1/2 circle, etc). Choosing the best needle configuration may be based on tissue type, depth, size, and accessibility.[1,3]

Needle point type is another important consideration during needle selection. Taper, or noncutting (●) needles may be sufficient for tissues that are easy to penetrate, such as viscera, fat and muscle. As a general rule, tapered needles may be used for all tissue closures except skin.

Cutting (▲) needles are honed to create at least 2 opposing sharp edges that can easily penetrate dense tissues such as fascia and skin. The three primary types of cutting needles available are conventional, reverse and tapered. Conventional curved cutting needles have a concave cutting surface with 3 cutting edges. The cutting edge of reverse curved cutting needles is located along the convex edge, which serves to increase the needle strength and minimize cutting areas located outside of the targeted tissue. Tapered cutting needles combine a cutting point with a round shaft. This feature is beneficial when it is necessary to penetrate both delicate and dense tissues.[3,4]

Another key element in suture performance is the needleholder. Needleholder jaws may be short or flat, concave or convex, and smooth or serrated. Furthermore, needleholder jaws containing embedded tungsten carbide particles offer 2 distinct advantages: 1.) The fine, granular jaw surface has better holding power as compared to its smooth-jawed counterparts and 2.) It is less apt to damage sutures than needleholder jaws containing teeth. [2,5]

The needleholder choice must be based on the surgical procedure (e.g., deep body cavities such as the chest or abdomen will require longer needleholders) as well as the desire to hold the selected needle securely and without causing damage to the needle or suture. Since needleholders may weaken over time and with repeated use, they should be carefully inspected prior to each procedure to assure proper jaw alignment and a secure grasp of the needle.[2] To prevent damage to the swage (a needle's fused connection to suture material) the needle should be securely grasped with the needleholder about 1/3 to 1/2 the distance from the swaged region to the needle point while completely avoiding the region near the swage.[5]