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DERIVATION OF SURGICAL INSTRUMENTS

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A surgical instrument is a specially designed tool or device for performing surgery or operation, to modify a biological tissue, or to provide access for viewing it. *Sushruta Samhita* describes 101 *Yantra* (blunt instruments), 20 types of *Shastra* (sharp instruments) which should be used for various Surgical and Para-surgical procedures. *Shastravacharaneeya adhyaya* describes types of surgical instruments, qualities of instruments with their utility. The most interesting point in the description is, the tip of the instrument resembling the face of animals and birds. Surprisingly, each instrument works on the basis of Archimedes law of Lever.

The law of the lever was proven by Archimedes using geometric reasoning. It shows that if the distance 'A' from the fulcrum to where the input force is applied (point A) is greater than the distance 'B' from fulcrum to where the output force is applied (point B), then the lever amplifies the input force. Levers are classified by the relative positions of the fulcrum and the input and output forces. It is common to call the input force *the effort* and the output forces *the load* or the resistance.

This allows the identification of three classes of levers by the relative locations of the fulcrum, the resistance and the effort:

Class 1: Fulcrum in the middle
Class 2: Resistance in the middle
Class 3: Effort in the middle

The designing of each instrument based on the input and output force. The shape of instruments resembling the mouth of an animal and bird beak indicates the surface area, input force and precision of work.

The principle of Surgery is 'Respect the tissue, tissue will respect you'. Instrument and their appropriate use will fetch the aptness in the work. If you need to manipulate a fine structure or an embedded foreign body in the tissues, need an instrument which reach the desired area without damaging the nearby structures. Likewise input force, precision of work and output force are very much essential in handling the instruments. These concepts can be well understood by analyzing the classification of Surgical Instruments described in *Sushruta Samhita*. This basic information developed with the new scientific inventions and became a landmark in the development of Medical health Care system.

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