IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

"A COMPREHENSIVE STUDY OF SURGICAL INCISIONS WITH SPECIAL REFERENCE TO TIRYAK CHEDA AND ITS APPLIED ANATOMY"

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ABSTRACT

Acharya Sushruta has described *Astavidha Shastrakarmas*, incisions being one among them. The type of incisions according to region has also been described. *Chedana* should be *Tiryak* at *Bhru* (eyebrow), *Ganda* (cheek), *Shankha* (temple), *Lalata* (forehead), Akshiputa (eyelid), *Ostha* (lip), *Dantaveshtaka* (gum), *Kaksha* (axilla), *Kukshi* (belly) and *Vankshana* (groin)region. Otherwise there is cutting of veins and ligaments, severe pain, delayed healing and appearance of polypus-like growth.

The understanding of *Tiryak Chedana* is still vague and needs to be studied in depth. There are various types of surgical incisions indicated in modern surgery. So in light of Ayurvedic and Modern references the surgical incisions in the regions were *Tiryak Cheda* has been advised by *Acharyas* were compared and assessed along with cadaveric dissection of these regions.

From the present study it was observed that there is significant relation between the *Tiryak Cheda* explained by *Sushruta* to the surgical incisions being practiced now. The incisions advised by *Acharya*s mostly follow the pattern of relaxed skin tension line and produces lesser damage of beneath structures

Key Words: *Tiryak Cheda*, surgical incisions, dissection.

INTRODUCTION

The history of trauma can be anticipated from the date, survival of the fittest. The surgical experience of the ancient age has been compiled systematically in Sushruta Samhita, which is a first documentation of its kind.[1]

Defining the anatomical site of the lesion is crucial if the physician is to resolve the problem effectively and compassionately. Therefore, a sound knowledge of anatomy is essential from the beginning of a modern medical education. The singular act of cadaveric dissection in Indian medical curricula brought about changes in the perception of body, health and illness.[2]

"Surgical incision is a cut in to body tissue or organ made during surgery with sharp instrument." Incision must not only give ready and direct access to the anatomy to be investigated but also provide sufficient room for operation to be performed with minimum damage of constituent structures. An incision along the cleavage line will heal as a narrow scar, whereas one that crosses the line will heal as wide or heaped up scar.[3]

Acharya Sushruta has indicated types of incisions according to region for Bhedana karma and also clearly described the reason behind it.[4,5]

There are various types of surgical incisions indicated in modern surgery, so in light of most advanced knowledge of anatomy, region wise comparative study of the incisions of both the science was done and also a trial was made to emphasize the uses of ancient knowledge today.

MATERIALS AND METHODS

Literary data were collected from, different classical texts, journals, internet, previous Thesis works etc.

Study was done to analyse the anatomical background of the regions where *Tiryak Cheda* has been mentioned by *Acharyas.*

Cadaver data was collected from dissection of 5 cadavers, carried out in the dissection hall of Alvas Ayurveda College, Moodbidri.

METHODOLOGY

•Dissections of 5 cadavers were carried out

•Observations of underlying anatomical structures of each of the regions were *Acharyas* has advised *Tiryak Cheda* was done.

•Collected data was analyzed and discussed emphatically.

Structurally well prepared and preserved cadavers were selected.

PROCEDURE

Detailed dissection of 5 cadavers was carried out.. The cadavers were 5 male subjects, with an estimated age range of 56 to 80 years. All cadavers were preserved in a standard formalin/phenol/alcohol solution and routinely dissected under guidance. The dissection procedures were carried out as per Cunningham's Manual of Practical Anatomy.

In the present study an attempt is made to see with a naked eye examination through the Ayurvedic point of view. Cadaveric dissection was undertaken to find out if the regions were Acharya advised to do Tiryak Cheda can be supported with anatomical structures and their applied anatomy.Anatomical backgrounds of areas where Acharya has mentioned Tiryak Cheda was studied in detail

The regions dissected were:

Eyebrow, eyelid, forehead, temple, cheeks, lips, neck, gum, axilla, belly and groin region.

OBSERVATION AND DISCUSSION

Acharya Sushruta has told that in eyebrows, cheeks, temples, forehead, eyelids, lips, gum, axila, belly and groin, Tiryak incision should be made. In hands and feet, one should make incisions like orb of moon while in anus and penis the same should be like half moon (semicircular).

The ideal incision should have the following characteristics:

- Easy to open.
- Minimize damage to tissues.
- Avoid cutting nerves.
- Split rather than transect muscles.
- Limit damage to fascia.
- Easy to close.
- Allow sufficiently strong closure.
- Allow sufficient access.
- Extendable if necessary.

(i)Incisions over Bhru (Eyebrows) region:

Acharya Sushruta has advised Tiryak incision at Bhru and modern surgery texts suggest slightly oblique incision (lateral eyebrow incision and superolateral incision). The oblique incision placed here follows the RSTL and muscle fibres of orbital part of orbicularis oculi. It neither cut the branches of superficial temporal vein and artery nor to the branches of supraobital nerve and of zygomaticotemporal nerve.

(ii)Incisions over Ganda (Cheek) region:

In modern surgery texts only one incision i.e. Fergusson's incision which is the combination of vertical and horizontal incision.

When the neurovascular supply in the cheek region was checked in dissection, it was found that nearly all the neurovascular supply runs horizontally or obliquely.so giving Tiryak (oblique) incision in internervous space and intervascular space may be good decision and also this will follow the RSTL pattern.

(iii) Incisions over Shankha (Temporal) region:

In the modern surgery texts, Gillies temporal incision was found which is of 2 cm length and directed upward and anteriorly at an oblique angle. It is placed in between the anterior and posterior diversions of

superficial temporal artery with very little risk to part of zygomatico temporal nerve. When the neurovascular supplies runs obliquely in this region. So making oblique incision in internervous and intervascular area will be safer and follow the RSTL pattern.

(iv) Incisions over Lalata (Forehead) region:

Modern surgery refers for horizontal, vertical and zigzag type incisions over the forehead region (in bicoronal incision, midline vertical incision and 'w' shaped incision). The relaxed skin tension lines (RSTL) are in horizontal pattern on most of the forehead except over a small area above the base nose where these are in oblique manner.

On dissection it was found that on lateral side the branch of superficial temporal artery runs horizontally whereas in medial part the branches of supraorbital vein, supraorbital nerve, supratrochlear artery and supratrochlear nerve runs vertically. Thus in lateral part of forehead Tiryak incision is right but in medial part incision should be vertical.

(v) Incisions over Akshiputa (Eyelid) region:

Modern surgery gives oblique incisions on eyelid in medial crease incision, upper lid incision (blepheroplasty), supratarsal incision, infraorbital subcilliary approach and infraorbital subpalpebral approach. In lateral canthotomy incision is horizontal. All these incisions follow the natural crease and the pattern of RSTL.

On dissection it was found that all the neurovascular structure running in upper and lower lids are in horizontal manner and the fibres of orbiclaris oculi muscle also run horizontally. Thus horizontal and oblique incisions are best here and support to the Tiryak chedana.

(vi) Incisions over Danta veshtaka (Gums):

In the texts of maxillofacial and dental surgery a condition i.e. impacted teeth was found, in which horizontal incision over gums of molar and premolar teeth was given. In this incision the branches of lingual artery and inferior alveolar artery and nerve may be at risk.

(vii) Incisions over the Gala (neck) and Jatru (clavicular) region:

In the texts of modern surgery it was found that all the incisions over neck 13 incisions were made horizontally over the neck In dissection it was found that all the neurovascular structures in the neck pass vertically. The horizontal or oblique incision may produce greater risk of damage but the natural fold's crease and relaxed skin tension line run horizontally in circular mode. As the Tiryak indicate to horizontal or oblique, the incisions over neck used in modern surgery support to the instruction of Acharya Vagbhata.

(viii) Incisions at Kaksha (Axilla) region:

In the texts of modern surgery, incision in deltopectoral approach of shoulder goes partly in axilla and it is a vertical incision by the definition of anatomical.The major structures at risk are, superiorly the acromial branch of thoracoacromial artery, inferiorly the musculocutaneous nerve, axillary nerve and cephalic vein. The modern surgery texts advise for giving the surgical incision either parallel to the relaxed skin tension lines or in natural crease. Here in axilla region both are the same so this incision gives better heal and cosmetic result.

(ix) Incisions at Kukshi (Abdomen) region:

After referring to the incisions over anterior abdominal wall, it was found that the vertical incisions are used only in the median plane of abdomen. The reason behind this may be that in the anterior abdominal wall most of the neurovascular supply runs in oblique way from lateral to medial.

In transverse incisions,the upper abdominal transverse incision and lower abdominal transverse incision, both the rectus sheath and muscle are incised in horizontal plane.

On review of oblique incisions over abdomen (subcostal incision, chevron incision, Mercedes benz incision, grid iron incision and right or left lateral oblique Kocher incision) it was found that all these incisions placed in internervous and intervascular space produces least neurovascular injury. All the oblique incisions follow the RSTL and natural fold's crease over abdomen.

On the basis of anatomy, in context of neurovascular injury it can be said that the use of oblique incisions over abdomen are much safer in comparable to transverse incisions because after damage, the vascular supply may restore by anastmosing vessels but the nerve supply will never be regained.

(x) Incisions at Vankshana (groin) region:

Acharya Sushruta has told the Tiryak incision in Vankshana (groin) region. The incisions of ingionofemoral area described in modern surgery texts are oblique. These are either parallel to inguinal ligament or curved in shape. These completely follow the RSTL and natural fold crease.

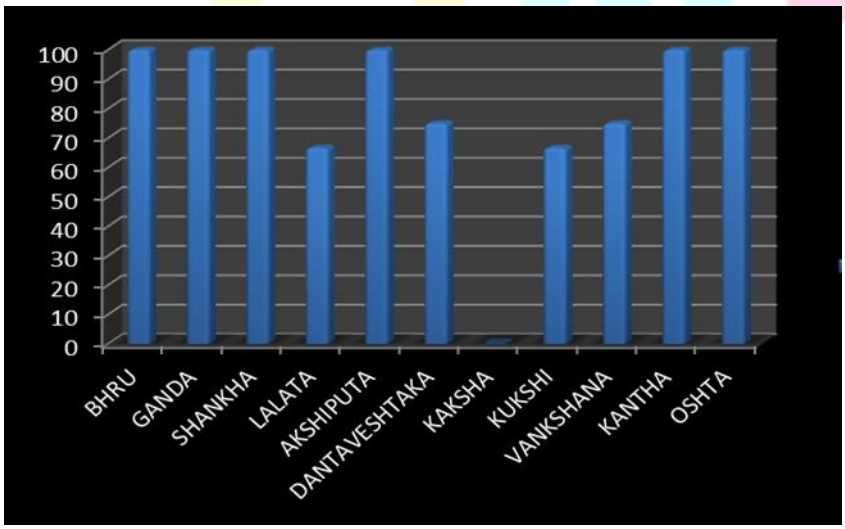
Region wise distribution of incisions in terms of directions:

Name of the region	Total incisions	Vertical incision	Horizontal incision	Oblique incision
Bhru (eyebrow)	2	0	0	2
Ganda (cheeks)	2	0	0	2
Shankha (temple)	1	0	0	1
Lalata (forehead)	3	1	0	2
Akshiputa (eyelids)	6	0	1	5
Dantaveshtaka (gums)	4	1	3	0

Kaksha (axilla)	1	1	0	0
Kukshi (abdomen)	15	5	3	7
Vankshana (groins)	4	1	1	2
Kantha (neck)	17	0	16	1
Oshta (lips)	1	0	0	1

Percentage of Tiryak Cheda in each region:

Name of the region	Total incisions	Total *TIRYAK* incisions (horizontal/oblique)	Percentage of *TIRYAK* incisions
Bhru (eyebrow)	2	2	100
Ganda (cheeks)	2	2	100
Shankha (temple)	1	1	100
Lalata (forehead)	3	2	66.7
Akshiputa (eyelids)	6	6	100
Dantaveshtaka (gums)	4	3	75
Kaksha (axilla)	1	0	0
Kukshi (abdomen)	15	10	66.67
Vankshana (groins)	4	3	75
Kantha (neck)	17	17	100
Oshta (lips)	1	1	100



In Bhru, Ganda, Lalata, Akshiputa ,Kantha and Oshta regions 100% of the incisions where found to be Tiryak, in Dantaveshtaka and Vankshana regions 75% of the incisions where Tiryak, in Lalata and Kukshi

regions 66.67% of the incisions where Tiryak and in Kaksha region Tiryak incision accounted to zero percentage.

RESULTS:

In the instances where Acharya has described Tiryak chedana to be done, when we compare the modern incisions of those regions it is observed that;

•Of the two incisions done in Bhru region, both were oblique and hence Tiryak in nature.

•Of the two incisions in Ganda region, both were oblique and hence Tiryak in nature.

•The only incision described in Shankha region is curved and hence Tiryak in nature.

•Of the three incisions in Lalata region, two were found oblique and one vertical. Thus two out of three are Tiryak in nature.

•Of the six incisions in Akshiputa region one was horizontal and five oblique, thus all being Tiryak in nature.

•Of the four incisions described in Dantveshtaka three was horizontal and one vertical, hence three out of four are Tiryak in nature.

•The only incision in kaksha region was vertical and hence not Tiryak in nature. Thus no instance of Tiryak incision was found in this region.

•Of the fifteen incisions in Kukshi region, five were vertical, three horizontal and seven oblique. Thus ten out of fifteen are Tiryak in nature.

•Of the four incisions, one was vertical, one horizontal and two oblique in Vankshana region. Thus out of four three are Tiryak in nature.

•Of the seventeen incisions, four were oblique and thirteen horizontal in the Gala and Jatru region. Thus all being Tiryak in nature as said by Acharya Vagbhata.

•The only incision described in Oshtha region is oblique and hence Tiryak in nature as said by Acharya Vagbhata.

CONCLUSION

•From the present study it can be concluded that there is significant relation between the Tiryak Cheda explained by Acharya Sushruta to the surgical incisions being practiced now.

•The incisions advised by Acharyas mostly follow the pattern of relaxed skin tension line and produces lesser damage of beneath structures.

•Planning a surgical incision requires considering many critical anatomical and logistical elements, all designed to afford safe and efficient mechanical exposure to the target of our efforts.

•Preserving deep and surrounding structures while taking into account the direction of the underlying muscles, critical neurovascular structures, and optimizing vascularity to healing structures is essential. Incisions for minimally invasive surgery should similarly follow these patterns of fold lines.

•The simplest rule for making incisions in the most favourable direction is to follow natural folding lines: "Proper incisions come together naturally and improper ones tend to gape."

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