

THE EFFICACY OF MODIFIED ANTI TENSION TAPE (HYPAFIX[®]) AS A PREVENTION OF HYPERTROPHIC SCAR IN FACIAL REGION MEASURED BY VANCOUVER SCAR SCALE (VSS)

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ABSTRACT

Introduction : Every wound healing process always leaves a scar, hypertrophic scar is a result of abnormal wound healing. Many therapeutic modalities have been discovered that can be used to deal with abnormal scar, but it's expensive. A modified Anti Tension tape can be used as a modality for hypertrophic scar prevention therapy with an affordable price

Aim : The purpose of this study is to find out the effect of application modified anti tension tape (Hypafix[®]) with the scar quality measured by Vancouver Scar Scale .

Methods : This is an observational analytic study using primary data and Cohort study method. The sample in this study were 32 people divided into 2 groups treatment and control group with Non-probability - Consecutive sampling as a data collection technique. The statistical test used is chi square.

Results: From 16 samples treatment group, 14 samples have a good scar quality, 2 samples have a medium/bad scar quality. From 16 samples control group, 5 samples have a good scar quality, 11 samples fall into medium/bad scar quality. Chi square score $p= 0,004$

Conclusion : There is a positive significant effect between the application modified anti tension tape (Hypafix[®]) with the scar quality measured by Vancouver Scar Scale

Keywords : Abnormal Scar, Hypertrophic Scar, Modified anti tension tape, Vancouver Scar Scale

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INTRODUCTION

Every process of wound healing always leaves a scar⁽¹⁾. Loss of the balance between collagen synthesis and degradation in the wound healing process is one of main factors in abnormal scar tissue formation. Loss of this balance usually caused an excessive deposition of collagen. There are 3 possibilities that caused excessive collagen deposition consist : 1. Increase of collagen synthesis do not followed by increase of collagen degradation; 2. Increase of both collagen synthesis and degradation, but synthesis is higher than degradation; 3. Normal collagen synthesis but decrease of collagen degradation⁽²⁾. Hypertrophic and keloid scar are product of abnormal wound healing. Hypertrophic scar occurs 4-8 weeks after the wound healing process followed by a rapid growth phase for up to 6 months. Hypertrophic scars usually have wound characteristics that do not exceed the original wound line, linear, if following a surgical scar, or papular or nodular following inflammatory and ulcerating lesions⁽³⁾.

Until now, abnormal scar is still an unsolved problem in some countries due to the high incidence of surgical trauma, the absence of adequate therapeutic modalities as prevention and prices that can't be reached by all society groups. Recent research shows that the incidence of abnormal scar has increased in the last 2-3 decades⁽⁴⁾. Abnormal scar formation is found in all races, except albino. Dark-skinned individuals such as Asian and African races have a higher incidence rate of 6% -16% than other races. Abnormal scar occurs in 40%-70% of post-surgical wounds, depends on the

depth of the wound itself. This abnormal scar formation indirectly affect life quality of an individual, especially in aesthetics terms⁽⁵⁾.

One of local factor that affect abnormal scar formation is tension. Research by Ogawa *et al* (2011) explained that high tension in a scar can promote a prolonged inflammation caused by hypoxia. Excessive cytokine pro-inflammation produced due to prolonged inflammation can caused high amount of fibroblast that later become collagen. High amount of collagen can caused abnormal scar formation⁽⁶⁾.

There are many therapeutic modalities that can be used to deal with abnormal scar. Each kind of therapeutic modalities has it own weakness, but the key from abnormal scarring treatment itself is the prevention, to get better aesthetic outcome⁽⁷⁾. Clinical experience by Herman a plastic surgeon in his practiced showed that hypafix® plaster was able to replace the function of surgical tape as one of treatment modalities to prevent abnormal scarring. The method used is a hypafix® plaster formed as butterfly shaped that is applied in two edges of the wound after doing the suture removal and wound observation done for three months. This study aims to know efficacy of modified anti tension tape as a hipertrophic scar prevention with the scar quality measured by vancouver scar scale.

METHODS

This is an observational analytic study and cohort study method. Using 32 people as a sample with consecutive sampling as a sampling technique. Sample of this study were primary data from

patient with the history of wound with a suture in facial region and fulfill the inclusion and exclusion criteria. Inclusion criteria in this study consist : 1. Using non absorbable polypropylene monofilament (Premilene[®]) as suturing materials ; 2. Wound length between 3-7 cm; 3. Does not have obesity; 4. Does not in immunocompromise condition; 5. Does not involved in steroid medication; Does not have diabetes mellitus. Sample who do not meet this inclusion criteria will be excluded from research sample. This study was held in Lavallette Hospital Malang and Persada Hospital Malang

32 patients who met the inclusion criteria were divided into 2 groups which is treatment group and control group. 16 patients in treatment group was the patients who got modified anti tension tape applied after suture removal. Modified anti

tension tape applied for 2 months. Scar outcome observed after 2 months modified anti tension tape application. 16 patients in control group was patients who didn't get modified anti tension tape. After suture removal, observation done 2 months after. Patient in treatment group compared to patient in control group to measure the better outcome in scar quality using Vancouver Scar Scale (VSS) as its instrument.

Data collected were analyzed using *Chi Square* test . The result from scar quality observation in treatment and control group divided into to group good quality and medium-bad quality. Modified anti tension tape used is Hypafix[®], butterfly shaped with 1 box for vertical side and 3 boxes for horizontal side (Picture1).



Picture 1. Modified Anti Tension Tape Hypafix[®] design

RESULT

Table 1. Sample Distribution Based on Age Group

Age Group	Frequency (n)	Percentage(%)
Baby	5	15.6
Kids	3	9.4
Teenager	11	34.4
Adults	13	40.6
Total	32	100

Table 2. Sample Distribution Based on Sex

Sex	Frequency (n)	Percentage (%)
Male	12	37.5
Female	20	62.5
Total	32	100

Table 3. Sample Distribution Based on Type of Surgery

Type of Surgery	Frequency (n)	Percentage (%)
Trauma	25	78.1
Elective	7	21.9
Total	32	100

Table 4. Sample Distribution Based on Modified Anti Tension Tape Application with Scar Quality Measured by Vancouver Scar Scale

Modified Tape Application	Scar Quality				Total	
	Good		Medium/ Bad		(n)	(%)
	(n)	(%)	(n)	(%)		
Yes	14	87.5	2	12.5	16	100
No	5	31.25	11	68.75	16	100

Most age group appeared in this research sample was adult with 13 as frequency number and 40.6% in

percentage (Table 1). Based on Table 2 sample distribution based on sex showed

that male had total amount 12 in numbers and 37.5% in percentage compared to female with total amount 20 in numbers and 62.5% in percentage. Based on Table 3 sample distribution based on Type of surgery showed that trauma surgery had a larger number with 25 in numbers and 78.1% in percentage compared to elective surgery with 7 in numbers and 21.9% in percentage. Table 4 showed that from 16 samples in treatment group which got modified anti tension tape, there were 14 samples with good scar quality outcomes and 2 samples with medium/bad scar quality compared to 16 samples from control group which didn't get modified anti tension tape with 5 samples with good scar quality and 11 samples with medium/bad scar quality outcomes. This results has been analyzed with SPSS using chi square test and showed that $p=0.004$ which mean there are positive significant effect between Modified Anti Tension Tape Application with Scar Quality measured by Vancouver Scar Scale

DISCUSSION

Statistical analysis of modified anti tension tape application with scar quality measured by Vancouver Scar Scale found p value's = 0,004. It can be concluded that there is a positive significant effect between modified anti tension tape application with scar quality (Picture 2 & 3). Research by Karwacinska *et al* (2012) about kinesiio tapping application

effectiveness in abnormal scar shows a good result in 54 samples. Research by Atkinson *et al* (2005) about paper tape application as a abnormal scar prevention in 70 patients after surgery shows a great result also. These 2 studies show that tension reduction in wound can fix scar quality outcomes^(8,9). One factor that affect abnormal scar occurrence is excessive collagen synthesis. Collagen synthesis influenced by hydroxyproline enzyme , while collagen degradation influenced by collagenase enzyme⁽¹⁰⁾. Research done by Tejiram *et al* (2017) shows that hydroxyproline reduction that affect collagen synthesis reduction found in low tension wound. Total collagen amount analyze using Masson's Trichome in this study shows a reduction of collagen amount in 2-3 weeks after tension reduction. Decrease of collagen formation gene expression consists type I collagen precursor COLIA2 and type III collagen precursor COLIA3AI also found in this study⁽¹¹⁾. Change in myofibroblast, matrix metalloproteinase, TNF- α , and TGF- β activity as factor that influence abnormal scar formation found in wound with low tension⁽¹²⁾.

Calcium dependent serine protein kinase- β 1 (CASK- β 1) activity has an inhibition effect in fibroblast. In low CASK- β 1 expression, a weakening of fibroblast inhibition found that affect increase of type I collagen. An increase of CASK- β 1 expression found in low tension wound⁽¹³⁾.



(Picture 2.1)

(Picture 2.2)

Picture 2. Wound condition after suture removal (Picture 2.1) and Wound condition 2 months after (without application of modified anti tension tape)(Picture 2.2)



(Picture 3.1)

(Picture 3.2)

(Picture 3.3)

Picture 3 Scar condition post sutire removal (Picture 3.1) Scar with anti tension modified tape (Picture 3.2) Scar condition 2 months post application of anti tension modified tape. (Picture 3)

Wound with low tension will support oxygen transport in wound area, so hypoxia condition can be prevented. Hypoxia condition needs to be prevented to avoid prolonged inflammation phase. This prolonged inflammation can cause *delayed wound healing*. During prolonged inflammation phase, over expression of pro-inflammatory cytokines such as CD41 and T-helper occurred^(14,15). This over expression of pro-inflammatory cytokines affect increase of interleukine and interferon that caused increase of fibrogenesis activity. Prevention of hypoxia condition also prevents excessive HIF-1 activity that will avoid excessive angiogenesis activity^(16,17).

Excessive hypoxia condition will promote abnormal scar formation, so that hyperoxia condition. Excessive oxygen consumption that caused a hyperoxia condition will promote excessive VEGF consumption, so angiogenesis activity will be excessive too^(6,18). Hypertrophic scar characteristic shows a excessive vascularization caused by angiogenesis. Prevention of hyperoxia condition in anti tension tape application should be considered by clinicians to prevent hypertrophic scar. Recommendation from some clinicians from a former study is reducing the tension 3 weeks after appliance to prevent hyperoxia⁽¹⁶⁾.

Application of anti tension modified tape needs to be done in a precise time. This should be done by considering the timeline of wound healing, based on the purpose of therapy. No study has been clearly compared the result of the tension reduction in 3 phases of wound healing, start from inflammatory phase, proliferation, and remodeling. Every phase in wound healing with intervention of tension reduction has different results.

Research done by Karwacinska *et al* (2012) about application of *kinesio taping* in wound that has been hypertrophic even keloid, shows positive clinical effects in scar quality. *Kinesio taping* give pressure and reduce tension in hypertrophic and keloid scar area. Other study by Atkinson *et al* (2005) about application of paper tape in patient with post section caesarean wound that applied right after suturing procedure shows a good result. Application of paper tape done right in inflammatory to proliferation phase. Tension reduction in this phase shows that prevented prolonged inflammation can produce better outcome scar quality. Tension reduction in this phase can reduce the activity of type I collagen and type III collagen which play much role in hypertrophic scar and keloid formation^(10,13). Application of intervention to reduce tension also can be done right after suture removal because when the suture is removed, the wound doesn't have any mechanical support to reduce tension, therefore the tension might be higher.

In this research, researcher using intervention timeline of tension reduction using modified tape right after suture removal. This has been done knowing the purpose of therapy is to make the anti tension modified tape as a prevention of abnormal scar.

CONCLUSION

The study found a positive significant effect between modified anti tension tape application with scar quality measured by Vancouver Scar Scale, due to prevention of hypoxia condition that lead to prevention of delayed wound healing.

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