FFI-NOTAT

Eksternnotat 20/01022

Aristeia tourniquet – clinical evaluation and user survey

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26 March 2020

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The document is electronically approved and therefore has no handwritten signature.

Keywords
Blodsirkulasjon, overlevelse, brukerundersøkelser, skuddsår, soldatutrustning

Summary
The company Aristeia has designed a new type of tourniquet. FFI has developed a prototype of the tourniquet, and carried out a clinical test on 17 volunteers in the Norwegian Armed Forces. For comparison, the current standard tourniquet in the Norwegian Armed Forces was tested. The results of this study will be used to improve the design of the Aristeia tourniquet.

Contents

1 Introduction

A tourniquet is a device, which applies pressure to a limb or extremity in order to limit – but not stop – the flow of blood. A tourniquet consists of a strap that can be tightened around the bleeding extremity so the bleeding stops and occlusion is reached. The use of prehospital limb tourniquets to stop life-threatening bleeding has been documented in several studies [1-3].

The company Aristeia AS, led by Gard Fostad Moe, has in partnership with The Mechanical Design and Workshop at FFI designed a new type of mechanical tourniquet. A prototype of the tourniquet produced at FFI was used in the test described in the current document. The purpose of the new tourniquet design is:

- Timesaving in seconds compared to existing solutions
- 100 % consistent blockage
- User friendliness

Preliminary tests of occlusion pressure done by Gulliksrud and Halvorsen [4] verified that the new tourniquet from Aristeia had an occlusion pressure above 300 mm Hg, and in most cases a significant smoother pressure distribution compared to today's standard. The necessary pressure to stop a bleeding is 250 mm Hg for thigh and 200 mm Hg for arm according to Tejwani et al. [5].

The Aristeia tourniquet is compared with the standard mechanical tourniquet used in the Norwegian Armed Forces, the SOF® Tactical Tourniquet (SOFTT) from Tactical Medical (Tacmed) Solutions, Anderson, South Carolina, USA. SOFTT uses a windlass mechanism to tighten the strap, this consist of metal rod that is turned around a textile belt attached to the tourniquet strap, Figure 1.1.

Figure 1.1 The SOF Tactical Tourniquet (SOFTT).

The Aristeia tourniquet has a handle instead of the windlass; the handle is connected to a mechanical system that tightens the tourniquet, Figure 1.2. Mainly large muscle groups is involved in the tightening process, so in theory one will need little time and training to put it on. The Aristeia tourniquet has a wider strap (48-50 mm) than the SOFTT, therefore it is anticipated that occlusion can be reached with lower pressure under the tourniquet [6-7].

Figure 1.2 The Aristeia tourniquet.

This is the first clinical evaluation and user survey of the new tourniquet. The results of these tests will be used to improve the design of the Aristeia tourniquet. There are several clinical evaluation methods for other tourniquets [8-14]. For this study, we used a modified method from three clinical evaluations conducted at Naval Medical Research Unit, San Antonio, Texas, USA (NAMRU-SA) and Navy Experimental Diving Unit, Panama City, Florida, USA [15-17]. These methods investigated the tourniquets effectivity and comfort when self-applied; this is more demanding than applying it on another person. For a more realistic and difficult situation

the volunteers did a specific physical exercise to increase hearth rate before each trial, Appendix A.

The participants in this study were trained in using the SOFTT tourniquet. They had also done some modifications to the SOFTT so that it was easier to self-apply. They got no training in using the Aristeia tourniquet before the test, just a brief demonstration. This was a way to test if it was possible to use the new tourniquet without any training, the user friendliness of the new tourniquet could be demonstrated. Trained application of one tourniquet is not fully translatable to other tourniquet types [18], so the same results for the two tourniquets were not expected.

2 Methods

Norwegian Regional Committees for Medical and Health Research Ethics (REC) approved the study the 30.10.2019, case number 33752. Participation in the present study was voluntary and all participants were free to withdraw at any time.

Participants were recruited from the Norwegian Armed Forces. Seventeen healthy male soldiers volunteered as test subjects. They applied the tourniquets on themselves. Both tourniquets were applied to one arm and one leg. Before each tourniquet application, the subjects completed a physical exercise to simulate field conditions, Appendix A.

Combinations of tourniquets and extremities were tested in a repeated measures design based on the following parameters:

1. Mechanical or application failures;
2. Application times;
3. Flow versus no-flow, as measured by Doppler ultrasound;
4. Subjective ratings of tourniquets by test subjects.

A mechanical failure is defined as a failure that occurred due to a malfunction of the materials from which tourniquet is constructed, or a design flaw that prevented successful application of the tourniquet. An application failure is defined as an application time exceeding two minutes. The application time was measured from the time the test subject began applying the tourniquet until no-flow measured with ultrasound occurred, and occlusion was reached. Two minutes after the tourniquet was applied, it was checked if there were still no-flow.

During arm trials, subjects used their non-dominant hands to apply tourniquets to the opposite upper arm. This was done to simulate a worst-case scenario, one in which combatants would need to apply tourniquets to the upper extremity with their non-dominant hands. Subjects could use both hands to apply tourniquets to the lower extremities. They sat on chairs during the applications.

Tourniquet efficacy was assessed by the presence or absence of arterial blood flow, as measured with a handheld vascular Doppler model, HI•dop BT-200V with an 8 MHz probe (BISTOS Co., Ltd, Korea). This model were also used during the course “Improvised Extremity and Improvised Junctional Tourniquet” under Special Operations Medical Association Scientific Assembly 2019.

The participants worked in groups of three or four. One person applied the tourniquet while another group member measured the ultrasound and the third and fourth member kept track of times. For each test, they marked the level of pain on a Visual Analog Scale (VAS), Appendix B. After the tourniquet test, they filled in a questionnaire about the two tourniquets, Appendix C.

Before the tests started, the volunteers got a brief demonstration of the Aristeia tourniquet. They were also shown how to use the ultrasound machine. Each person had a scheme to write times and comments on, appendix D. All subjects started with the Aristeia tourniquet applied on their upper arm, then on their thigh, before they applied the SOFTT on their upper arm and then their thigh.

All analyses were done in Microsoft Excel. Mean differences between the Aristeia tourniquet and the SOFTT were investigated using paired Students t-test.

3 Results

3.1 Observations

The volunteers tended to use the same strength to tighten the Aristeia tourniquet as they did with the SOFTT. As a result, ten of the cords attaching the handle to the tourniquet snapped, and one of the straps tore. It varied how the volunteers responded to this; some marked it as a failure on the scheme while others started over with a new tourniquet.

A flaw was detected in the design of the Aristeia tourniquets. The strap could only be tightened by pulling it one way. This made it more difficult to apply it on the arm if the tightening had to be done by pulling away from the body. The weight of the mechanism caused it to fall down on

the underside of the arm for some subjects, especially for those who had applied it the “wrong” way. The pulling was easier for them when the mechanism was on the underside of the arm.

The release button on the Aristeia tourniquet was difficult to use. Most of the subjects needed help to loosen the tourniquet after the application.

3.2 Mechanical and application failures

Both mechanical and application failures (described on page 5) occurred for the Aristeia tourniquet. For the SOFTT only application failures occurred. Weather mechanical failures led to application failures is unclear. All the failures are presented in Table 3.1.

Tourniquet/limb	Number of applications	Mechanical failure	Application failure
Aristeia/arm	17		2
Aristeia/leg	17		5
Aristeia	34	11	
SOFTT/arm	17		2
SOFTT/leg	16		1

Table 3.1 Number of tourniquet applications and failures.

3.3 Application times

The application time was measured from the time the test subject began applying the tourniquet until no-flow measured with ultrasound occurred, and occlusion was reached. Mean application times are presented in Table 3.2.

Tourniquet/limb	Number of successful applications	Mean application time (sec)	Standard Deviation (sec)	Median application time (sec)
Aristeia/arm	15	56.8	36.2	40.0
Aristeia/leg	12	42.4	25.2	37.5
SOFTT/arm	15	47.7	22.6	45.0
SOFTT/leg	15	53.3	29.7	42.0

Table 3.2 Number of successful applications and mean application times.

Except for the mechanical and application failures enumerated in Table 3.1, subjects were able to apply the Aristeia tourniquet to extremities in 17 to 118 seconds, and the SOFTT in 20 to 117 seconds. There were no significant differences in application times between the two tourniquets.

3.4 Doppler flow results

The application time was measured from the time the test subject began applying the tourniquet until no-flow measured with ultrasound occurred, and occlusion was reached. Two minutes after the tourniquet was applied it was checked if there were still no-flow. The Doppler flow results are presented in Table 3.3.

Tourniquet/limb	Number of successful applications (no-flow)	Number of still no-flow after 2 minutes	Number of reoccurring flow after 2 minutes
Aristeia/arm	15	10	5
Aristeia/leg	12	11	1
SOFTT/arm	15	12	3
SOFTT/leg	15	13	2

Table 3.3 Doppler flow results.

3.5 Subjective ratings

3.5.1 The VAS

For each test, the volunteers marked their level of pain on a Visual Analog Scale (VAS), Appendix B. The scale has no markings, but is exactly 100 mm long. It starts with “No Pain” and ends with “Pain as bad as it could possibly get”. The results from the VAS are presented in Table 3.4.

Tourniquet/limb	Number of markings	Mean marking (mm)	Standard Deviation (mm)
Aristeia/arm	17	37.2	13.4
Aristeia/leg	17	41.7	24.3
SOFTT/arm	16	51.8	16.5
SOFTT/leg	15	57.5	22.3

Table 3.4 The VAS results.

The volunteers found the Aristeia tourniquet significantly less painful than the SOFTT, respectively $p = 0.004$ for arm and $p = 0.041$ for leg.

3.5.2 The questionnaire

After the tourniquet tests, the subjects filled in a questionnaire about the two tourniquets, appendix C. There was one questionnaire for each of the tourniquets with similar questions. For each question they had to mark from 1 to 10, were 1 was bad and 10 were good. There was also room for comments to each question. The results from the questionnaire are presented in Table 3.5.

Question	Aristeia, mean ± standard deviation	SOFTT, mean ± standard deviation
User friendliness arm	5.4±2.4	6.0±0.7
User friendliness leg	6.5±1.6	7.1±1.4
Initial tightening mechanism	5.3±2.4	6.6±1.3
Main tightening mechanism	5.6±2.6	5.7±1.2
Safety	7.6±1.8	7.1±1.8
Comfort	5.9±1.4	4.1±1.6
Durability	3.7 ±2.5	7.9 ±1.7

Table 3.5 The questionnaire results.

The only significant differences are in comfort and durability, were the Aristeia tourniquet is more comfortable ($p = 0.003$), but less durable ($p = 0.001$).

The comments in Norwegian are listed in Annex E. A summary of the comments in English are presented in Table 3.6.

Question	Tourniquet	Comments
User friendliness arm	Aristea	Difficult to tighten with one arm. Easy to twist the strap.
	SOFTT	Training needed. Can be difficult to fasten the metal rod.
User friendliness leg	Aristea	Pinches bare skin, painful. Not possible to open the strap if necessary. Easier to use with two hands.
	SOFTT	Training needed, easy to use with two hands.
Initial tightening mechanism	Aristea	Easy to twist the strap. Can be difficult to use with one hand.
	SOFTT	Easy to use with modifications (help from the mouth on arm application).
Main tightening mechanism	Aristea	Easy to use, good idea, the cord snapped to easy.
	SOFTT	Difficult to fasten the metal rod.
Safety	Aristea	Difficult to remove by yourself, help needed.
	SOFTT	Difficult to fasten the metal rod.
Comfort	Aristea	Pinching of bare skin is painful, except for that okay.
	SOFTT	Pinching painful.
Durability	Aristea	The cord snapped. Other parts of the tourniquet appeared solid.
	SOFTT	Is robust.

Table 3.6 Summary of comments about the tourniquets.

4 Discussion

4.1 Observations

Some of the failures could have been prevented with more instructions beforehand. One of the aims with this study was to look at user friendliness. Another aim was to see if the Aristeia tourniquet was possible to use without any training. Hence, the soldiers were not allowed to practice with the tourniquet before the test, they were just given a short demonstration.

To prevent the Aristeia tourniquet from being loosened by mistake, the release button was intentionally made hard to use. However, the volunteers found it too difficult to loosen it after the application.

4.2 Mechanical and application failures

It varied how the volunteers responded to the mechanical failures of the Aristeia tourniquet. Weather mechanical failures led to application failures is therefore unclear.

If the soldiers did not manage to stop the blood flow in two minutes, it was registered as an application failure. There were two application failures on the arm for both the Aristeia tourniquet and the SOFTT. On the leg, there were one application failure for the SOFTT and five application failures for the Aristeia tourniquet. On the legs, the subjects used more force to apply the tourniquets. This was also the limb where most of the mechanical failures occurred.

4.3 Application times

Mean application times are presented in Table 3.2. There were no significant differences in application times between the two tourniquets. The variation in application time was high, especially for the SOFTT. This was unexpected since the subjects were trained in using this tourniquet. It is usually more demanding to self-apply tourniquets to upper arms than thighs. The modifications the volunteers had done on the SOFTT made them easier to self-apply with one arm. With these modifications they could also use their mouth during tightening.

4.4 Doppler flow results

Doppler flow results are presented in Table 3.3. SOFTT had reoccurring Doppler flow in 17% of the successful applications, while Doppler flow reoccurred in 22% of the successful Aristeia applications. Some of the reoccurring flow in the Aristeia tourniquet tests on arms may be due to the positioning of the tourniquet mechanism on the inside of the arm. This is not the optimal area to have the tourniquet mechanism because it will cover the main artery in the arm and prevent a complete occlusion.

4.5 Subjective ratings

The Aristeia tourniquet is rated significantly less painful on the VAS, and significantly more comfortably in the questionnaire, than the SOFTT. It is part of the aim for the new tourniquet to make it more user friendly.

Mainly because of snapping of the cord in the Aristeia tourniquet, it was rated significantly less durable than the SOFTT. Nevertheless, the volunteers liked the idea of a handle to pull instead of the windlass mechanism.

The subjects also noted that the strap of the Aristeia tourniquet became twisted under initial tightening. Some of the subjects used as much force as they could for this tightening, wrapping the strap around the hand and pulling as hard as they managed. This is not necessary under initial tightening, which is just for securing the tourniquet around the limb.

In some cases when applying the Aristeia tourniquet, a metal rod guiding the strap under the tightening mechanism pinched bare skin and caused pain.

5 Conclusions and recommendations

This is the first clinical evaluation and user survey of the Aristeia tourniquet. The results of these tests will be used to further improve the design of the new tourniquet.

The goal with the Aristeia tourniquet design is:

- Timesaving in seconds compared to existing solutions
- 100 % consistent blockage
- User friendliness

Without any training, the volunteers managed to use the new tourniquet just as fast as their own standard tourniquet. They had only one attempt on each limb, starting with the most difficult one, the upper arm.

This study did not focus on consistent blockage and the ability to maintain the blockage over time. The Doppler flow results indicate that the Aristeia tourniquet and the SOFTT has the same ability to maintain blockage, however, further testing is necessary to confirm that.

The volunteers found the Aristeia tourniquet less painful and more comfortable than their own standard tourniquet, the SOFTT. They also preferred the handle instead of the windlass mechanism, as they found the handle easier to use.

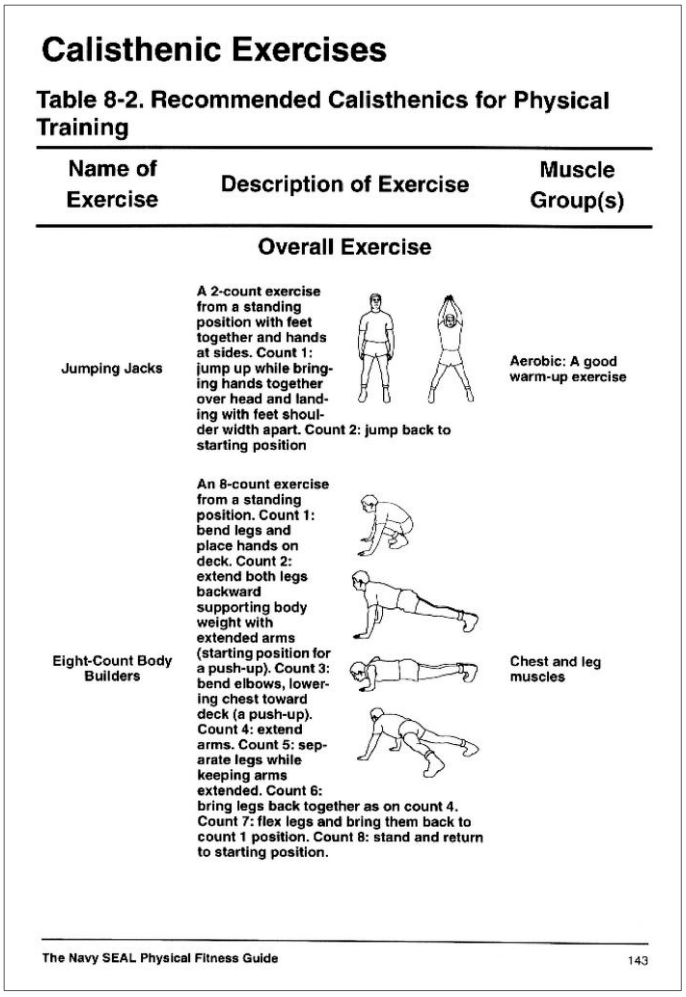
We recommend using a more durable strap and cord on the Aristeia tourniquet. It should be easier to loosen the tourniquet by yourself. The design with the metal rod that guides the strap should be changed to avoid painful pinching.

The Aristeia tourniquet requires the users to know that the initial tightening is just for securing the tourniquet to the limb.

The design flaw that caused the strap to be tightened by pulling only one way, is already corrected.

Appendix

A Exercise before each application



Calisthenic Exercises

Table 8-2. Recommended Calisthenics for Physical Training

Name of Exercise	Description of Exercise	Muscle Group(s)
	Overall Exercise	
Jumping Jacks	A 2-count exercise from a standing position with feet together and hands at sides. Count 1: jump up while bringing hands together over head and landing with feet shoulder width apart. Count 2: jump back to starting position	Aerobic: A good warm-up exercise
Eight-Count Body Builders	An 8-count exercise from a standing position. Count 1: bend legs and place hands on deck. Count 2: extend both legs backward supporting body weight with extended arms (starting position for a push-up). Count 3: bend elbows, lowering chest toward deck (a push-up). Count 4: extend arms. Count 5: separate legs while keeping arms extended. Count 6: bring legs back together as on count 4. Count 7: flex legs and bring them back to count 1 position. Count 8: stand and return to starting position.	Chest and leg muscles

The Navy SEAL Physical Fitness Guide 143

Figure- A.1 The Figure shows the callisthenic exercise that the volunteers completed before each tourniquet application. The volunteers completed 20 repetitions of the Eight-Count Body Builders, page 143 in The Navy SEAL Physical Fitness Guide. This exercise was also used during the course "Improvised Extremity and Improvised Junctional Tourniquet" under Special Operations Medical Association Scientific Assembly 2019.

B Visual analog scale

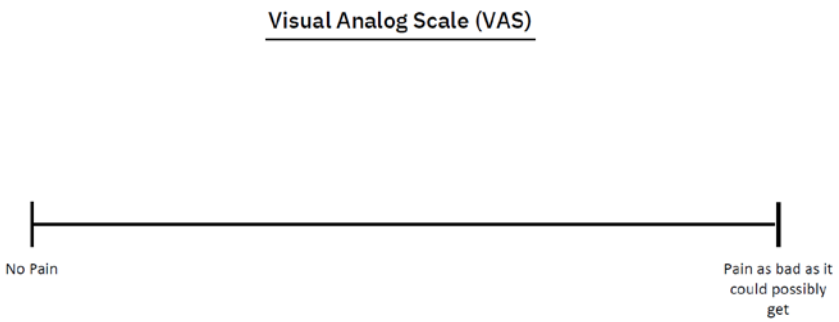


Figure- B.1 The Visual analog scale used in the test, the scale is 100 mm wide.

C Questionnaire

Each subject completed a questionnaire for the tourniquets, one questionnaire for each of the tourniquets, Figure- C.1.

Spørreskjema – Pull Cord Tourniquet Nr.

Generell Brukervennlighet

ARM

Dårlig God

1	2	3	4	5	6	7	8	9	10

Kommentarer

BEIN

Dårlig God

1	2	3	4	5	6	7	8	9	10

Kommentarer

Primær Strammemekanisme

(Båndet trekkes gjennom huset for å sikre turnikéen)

Dårlig God

1	2	3	4	5	6	7	8	9	10

Kommentarer

Sekundær Strammemekanisme

(Trekkstroppen brukes for å bygge opp trykket)

Dårlig God

1	2	3	4	5	6	7	8	9	10

Kommentarer

Sikring

(Oppleves turnikéen som sikker/usikker etter at trykket er bygget opp)

Dårlig God

1	2	3	4	5	6	7	8	9	10

Kommentarer

Komfort

(Hvordan er turnikéen å ha på)

Dårlig God

1	2	3	4	5	6	7	8	9	10

Kommentarer

Slitesterkhet

(Oppleves turnikéen som lite slitesterk/solid)

Dårlig God

1	2	3	4	5	6	7	8	9	10

Kommentarer

Figure- C.1 Questionnaire for the Aristeia tourniquet, a similar questionnaire was used for the SOFTT.

D Scheme used during application

Testperson nummer				Omkrets arm		Omkrets bein	
Aristeia	Rekkefølge (1,2,3 og 4)	Lyd funnet og markert	Stramming av turnike (starte klokke)	Tid til lydstopp, maksimal tid 2 minutter (noter tid)	Turnike på i 2 minutter (starte ny klokke)	Nesten 2 min sjekke lyd (Ja/Nei)	Turnike fjernes, sjekk at lyd kommer tilbake
Arm							
Bein							
Soft T	Rekkefølge (1,2,3 og 4)	Lyd funnet og markert	Stramming av turnike (starte klokke)	Tid til lydstopp, maksimal tid 2 minutter (noter tid)	Turnike på i 2 minutter (starte ny klokke)	Nesten 2 min sjekke lyd (Ja/Nei)	Turnike fjernes, sjekk at lyd kommer tilbake
Arm							
Bein							

Figure- D.1 The Figure shows the scheme used during application, one scheme was filled in for each volunteer.

E Comments

All comments are in Norwegian, Table- E.1 Comments user friendliness arm, Table- E.2 Comments user friendliness leg, Table- E.3 Comments initial tightening mechanism, Table- E.4 Comments main tightening mechanism, Table- E.5 Comments safety, Table- E.6 Comments comfort and Table- E.7 Comments durability.

	User friendliness arm
Aristeia	Primærstrammebåndet krøller seg
	Tung, ødelegges den er den ubrukelig
	Bruker litt mye krefter på å få den til å stoppe blod.
	Vanskelig å stramme raskt med en hånd, båndet sklir mye rundt i initialstrammingen.
	Glir mye rundt arm når man skal stramme
	Problem når strammehuset kommer på innsiden av armen
	Stor og klumpete, vanskelig og initial stramme
	Ideen er god, men strammemekanismen har en tendens til å falle på nedside/innside av armen, og derfor ikke stoppe blodet optimalt. Strammemekanismen klemmer/klyper seg fast i huden
	Vanskelig å stramme med en arm, får enkelt krøll på reim
	Svært vanskelig og sette på seg selv med en arm
	Veldig vanskelig å initialstramme. Krøller seg lett
SOFTT	Tar litt lang tid å stoppe puls
	Lett å forstramme og etterstramme
	Krever trening
	Mulighet for å åpnes. Mindre. Lettere. Vanskelig å få den festet

	Kan være vanskelig å stramme skikkelig
	Vanskelig å få låst tournique'en til tider. Dette avhengig av hvilken posisjon strammepinnen er i når stram
	Lett å få på, vanskelig å stramme med en arm
	Kan være vanskelig å sikre pinnen
	Krever mye drilling for å sette på egen arm

Table- E.1 Comments user friendliness arm.

	User friendliness leg
Aristeia	Får ikke strammet nok på beinet
	Tung, ødelegges den er den ubrukelig
	Veldig lett, men blir ikke helt stram initielt. Kan ikke hektes av hvis man f.eks. har pistolhylster på låret.
	Fin å stramme på benet, men siden den alltid er en løkke så kan det være vanskelig å få den på om du ikke kan bevege benet eller har mye utstyr på deg.
	Røyk når den skulle strammes
	Burde være en åpnefunksjon på stroppen slik at man ikke må trekke over hele beinet/arm dersom man er i en situasjon der det er vanskelig
	Smertefull. Hud kommer i klem
	Mye lettere å operere med 2 hender
	Strammemekanismen klyper i huden, ellers OK
	Metallspenne på underside gnager
	Enkel å bruke når du har to hender, men får ikke strammet den nok uten at strammetråden ryker

	Krøller seg lett
SOFTT	Tar litt lang tid å stoppe puls
	Lett å klipse av for så å klipse på igjen
	Krever trening
	Kan åpnes. Fin å stramme på låret, og du kan få trykket direkte mot punktet hvor arterien er
	Vanskelig å få stram nok til å få best effekt av sekundær stramming
	Lett å operere med 2 hender
	Tungt å stramme godt nok
	Enkel å bruke med 2 armer

Table- E.2 Comments user friendliness leg.

	Initial tightening mechanism
Aristeia	Løsner litt opp på det strammeste. Vanskelig å få tight på arm uten bitestropp.
	Vanskelig å stramme med en hånd, ikke noe mothold
	Krøller seg bittelitt i kantene
	Funket greit, glei mye rundt
	Vanskelig å håndtere det store klumpete huset og få den på rett side
	Båndet glir bra, men strammemekanismen er stor og tung og vanskelig å håndtere
	Får krøll/brettes. Vanskelig å stramme fullstendig
	Båndet krøllet seg lett

SOFTT	Greit å forstramme
	Har egen modifisert mothold som fungerer godt
	Funker bra med bitetråd
	Med moding med bitesnor ganske greit
	Med rett teknikk er det meget effektivt

Table- E.3 Comments initial tightening mechanism.

	Main tightening mechanism
Aristeia	God tanke, ryker altfor fort
	Ble ikke stram nok på arm. Trenger sterkere tråd da den røyk.
	God ide
	For svak. Kantene rundt åpningen sliter på tråden. Fester du den på armen må vinkelen være perfekt for å få strammet skikkelig.
	Røyk fort
	Trekkstroppen tålte lite, bør byttes med vaier
	Svak, fare for at tråden ryker
	Ideen er veldig god, men flere ganger virker tråden løs og strammer ikke når man drar i den. Ryker lett
	Enkel å bruke
	Stroppen ryker lett
	Trekkstroppen røk flere ganger
	Godt konsept og fungerer bra, men snoren begynte å slites etter få gjennomkjøringer

SOFTT	Vanskelig på de siste rundene
	Krever arbeid for å få låst
	Tungt å stramme med en hånd og tricky å feste. Må muligens overstramme eller understramme for å feste
	Vanskelig å stramme helt med 1 arm
	Vanskelig å feste

Table- E.4 Comments main tightening mechanism.

	Safety
Aristeia	Vanskelig å fjerne selv
	Oppleves som sikker
	Hard å få opp
	Holder trykket
SOFTT	Stopper ikke blodet helt. Ujevnt strammet
	Litt vanskelig å sikre, men den sitter når festet

Table- E.5 Comments safety.

	Comfort
Aristeia	Fikk den ikke ordentlig stram. Klyper bar hud
	Arm ganske vondt, bein bra
	Drar med seg hud inn i stroppen, "klyper"

	Vond (men det skal den være)
	Spennen kan klype litt. Man kan få perfekt trykk og slippe å stramme den unødvendig mye for å få festet den.
	Litt klyping når båndet trekkes inn
	Mer behagelig en eldre (soft tourniquet)
	Grei på arm. Helt jævlig på ben, pga. klemming av hud mot metallstang som trekkes inn i huset
	Dersom hud ikke er i klem føles den god å ha på
	Helt OK
	Omtrent som man kan forvente, men hud kan komme i klem
SOFTT	Klyper mye på benet
	Grei, den klyper litt
	Smertefull
	Vond på arm, grei på ben
	Blir veldig vond når stram

Table- E.6 Comments comfort.

	Durability
Aristeia	Burde være sterkere bånd og strammesnor
	Sekundærstrammingen ryker. Bånd frynser seg
	Tråd røyk
	Oppleves solid

	Tråden er dårlig, men den er ellers solid.
	Blei fort ødelagt
	Båndet røk en gang og trekksnor 2 ganger
	Ødela 3 stykk under testing, 2 stykk sekundær stramming kabel, 1 stykk hoved stramme bånd
	3 stykk som røk
	Oppleves ikke som solid. Tynn tråd. Flere ble ødelagt under utprøving
	Snoren virker svak, resten virker solid
	Strammetråden ryker lett. Vanskelig å få av
	Trekkstroppen røk flere ganger og båndet viste slitasje
SOFTT	Blir litt slapp etter hvert
	Virker robust
	Enkel og robust

Table- E.7 Comments durability.

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