

# Simulated use of the “Grasping Tie” as for colo-rectostomy after low rectal resection



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## Abstract

*Simulated test of effectiveness of the original tool grasping tie, technically already illustrated in two previous papers listed in bibliography, for fixing a spongy rubber tube, simulating a rectal stump on the anvil’s axle of a circular stapler, by tightening over it a nylon ribbon slip-knot (the tie). After connecting the anvil to the stapler head through an other spongy rubber tube simulating a colonic loop, and the firing of the stapler, it is demonstrated the correct circular anastomosis achievable.*

**Key words:** Grasping tie, low rectal resection, automatic surgical tool, purse string substitute, circular stapler.

## Introduction

It is well known that in some circumstances there are particular difficulties in the execution of an anastomosis of the digestive tract for the eventual narrowness of the operative field, beyond the delicacy of the structures on which to work.

This is the case of the colo-rectal low anastomosis after a left colonic resection extended to the high rectum. The relative incidence of rectal cancer, especially of the middle third, and however the oncological necessity, today world wide accepted, of the removal of the complete entire mesorectum, for each case of cancer extending down from the sigmoido-rectal junction, commit the surgeon to dissect as a rule the rectum with mesorectum straight down the anus elevator muscles plan in the depth of the pelvis. In this narrow space the necessary manoeuvres to perform a classical purse string for the subsequent use of a circular stapler, to obtain a further reduction of the specific morbidity, result often difficult. In fact the dimensions of the specific tool for manual purse string, especially if it is T shaped, and also those of the automatic tool for “purse string” – technically however only relatively reliable – make very often purely notional this type of solutions because of the incongruity of both the tools with the ingrown pelvic space. The encumbrance of the tool for manual purse string is by itself enough limited, but it is as a fact doubled when one tries to pass the needles

## Riassunto

**USO SIMULATO DEL “GRASPING TIE” COME PER ESOFAGO-DIGIUNOSTOMIA DOPO GASTRECTOMIA TOTALE**

*Prova simulata della funzionalità del grasping tie, già illustrato tecnicamente in altro lavoro indicato in bibliografia, nel fissare un tubo di gomma spugnosa simulante un moncone rettale all’asse dell’incudine di una suturatrice meccanica circolare, serrandovi intorno a cappio un anellino di nylon (il tie). Dopo connessione dell’incudine alla testina della suturatrice introdotta in un altro tubo simulante un’ansa del colon segue la confezione in modo corretto della sutura circolare meccanica.*

**Parole chiave:** Grasping tie, resezione del retto, strumenti chirurgici automatici, borsa di tabacco, stapler circolare.

with thread for the fulfilment of the purse, and often its use results uneasy.

Also shifting to the “roticulator” stapler – adopting the technique of Knight and Griffen – is sometimes likewise uneasy, and always for space reasons. One needs then to abdicate to all these solutions and return to the always uneasy and often difficult manual running purse string. From these considerations has risen the idea that has brought to the designing of a surgical tool planned to fix the low rectal stump to the axle of a circular stapler inserted from the external side through the anus, with the least

encumbrance at the operative side and with the capability of driving the tightening action and the subsequent cutting one of a nylon ribbon, operating on the levers of the handler at distance from the point of application. The structure of this tool, denominated "grasping tie" to point out with the same name his function and already well illustrated in two previous papers (2, 3), is such that the operative side of the tool is not bigger and thicker than a point finger, and the manoeuvres that activate its two functions are carried out from the handle, far from the operational extremity.

Before its use in the operating theatre, by now repeatedly put in practice, the grasping tie has been previously used to perform a series of simulations for proving its effectiveness and to learn the custom, and it is time to communicate here this type of experience.

## Material and method

For the simulation of the use of the grasping tie in a virtual colo-rectal low anastomosis after a resection of the rectum we have used two rubber spongy tubes of the type in use for the demonstrations shows of the mechanical staplers. One of them had used to feign the stump of left colon resected well above the presumptive tumour position, and the other to feign the rectal stump shortly below a low rectal tumour, according to the scheme shown in the Figure n. 1.

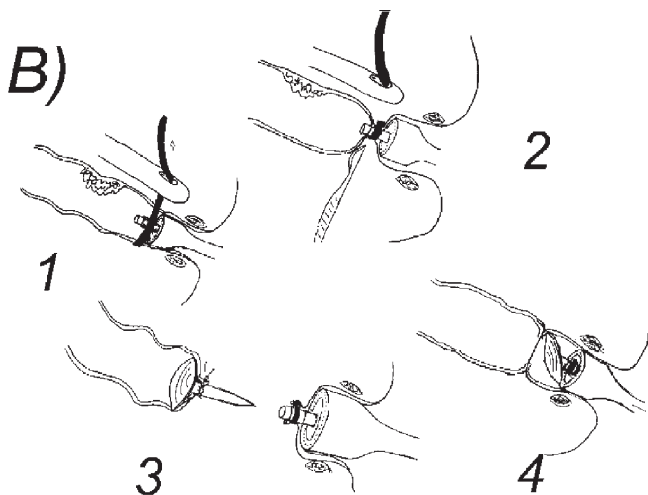


Fig. 1: Scheme of the use of grasping tie to perform a low colo-rectal anastomosis after a low rectal resection - 1) nylon slipknot around the rectal stump dissected down the plan of the elevator ani muscles, after the introduction of a circular stapler anvil in the anus and complete descent of its axle, well palpable from outside the gut; 2) tightening of the slipknot ("tie") with the grasping tool, cutting of the overflowing tail, and resection of low rectum, conveniently far from the tumour site; 3) connection of the head of the stapler, fixed with purse string to the left colon stump, to the anvil's axle introduced through the anus, with the rectal stump well fastened by the "tie"; 4) firing of the stapler, performing the anastomosis, withdrawing of the tool with the two "muscle-mucous" rings, one of the them well fixed by the nylon slipknot ("tie").

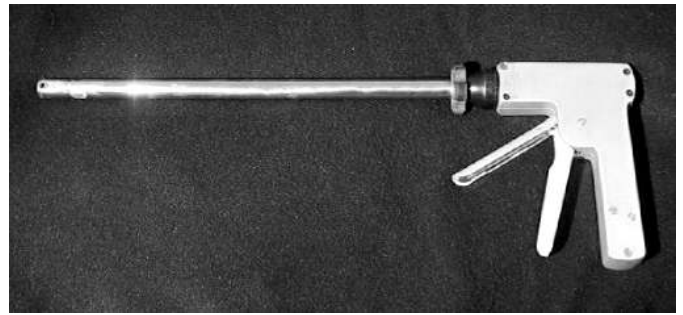


Fig. 2: Linear prototype of the grasping tie, with revolvable axle, therefore usable also for video-laparoscopic mini invasive surgery.

## Simulation as for colon-rectostomy after a low resection of the rectum with the use of Grasping tie

For fixing the head of the stapler to the left colon stump it is used the common steel tool. (Fig. 3 a, b).

A circular stapler is inserted from the "anal" opening



Fig. 3a.



Fig. 3b.

of the rubber pipe feigning the rectum: the site of the "tumour" has been drawn like a dark stain (Fig. 4 a). A nylon ribbon as those used in electronics for tightening electric cables is put to surround the rectum at a

sufficient distance from the "tumour," and closed as slip-knot (Fig. 4 b, c) around to the stapler axle drawn out and well palpable across the wall (Fig. 4 d). Activating repeatedly the longer lever of the grasping the



Fig. 4a.



Fig. 4c.



Fig. b.



Fig. 4d.

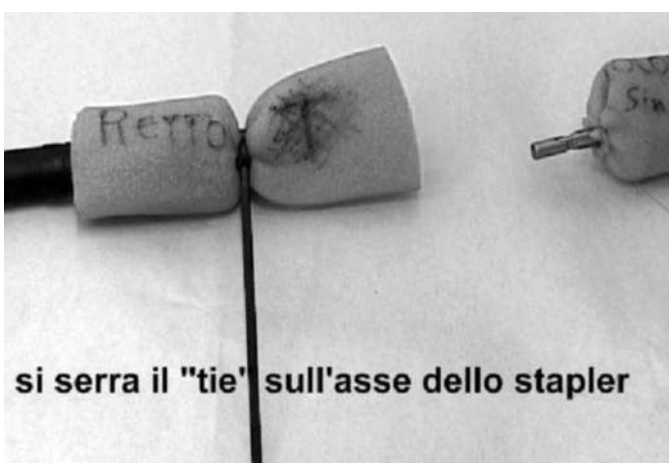


Fig. 5a.



Fig. 5b.



slipknot of the nylon ribbon ("tie") becomes progressively narrower and eventually tightened to strongly fix the "rectal stump" around to the axle of the stapler (Fig. 5 a, b, c) and then with the short lever of the grasp-

ing the overflowing tail of the ribbon ("tie") is severed (Fig. 5 d). The "rectal" stump is dissected free just above of the "tie", and the severing of the "rectum" is at convenient



Fig. 5c.

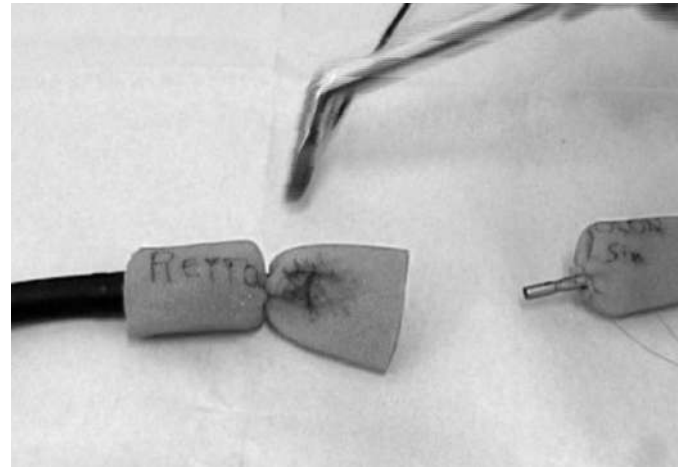


Fig. 5d.



Fig. 6a.

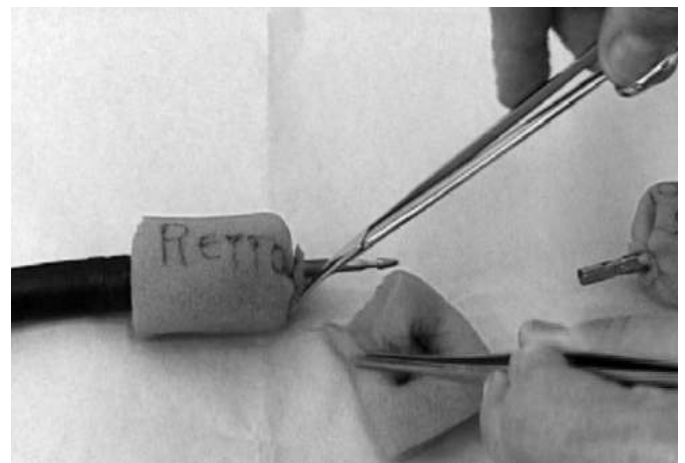


Fig. 6b.

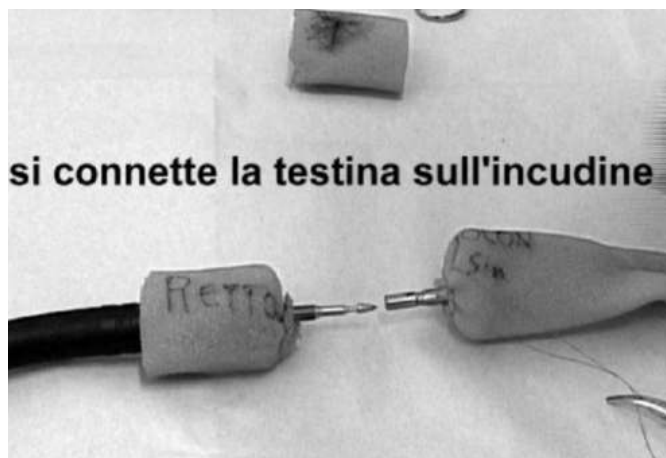


Fig.6c.

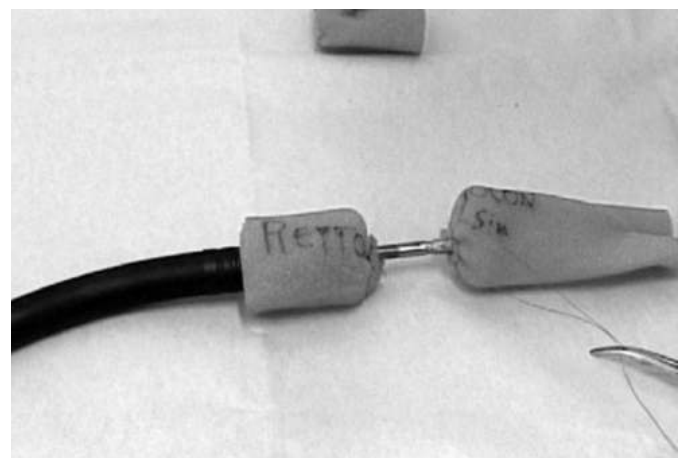


Fig. 6d.



Fig. 7a.

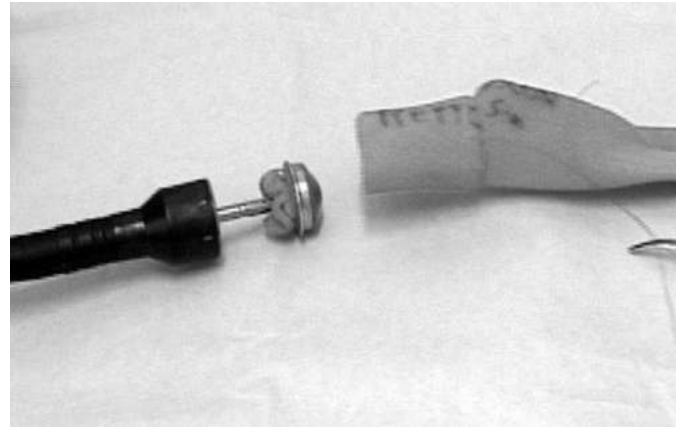


Fig. 7b.



Fig. 7c.



Fig. 7d.

distance from the "tumour" (Fig. 6 a, b), but leaving a convenient minimal margin on the distal stump above the "tie" (Fig. 6 b). Head and anvil of the stapler are driven closer, simulating so a stapler colo-rectal anastomosis (Fig. 6 c, d).

Approached with the special screw of the stapler the two stumps (Fig. 7 a), they are tightened together and with the firing of the tool the mechanical anastomosis is completed, the stapler is withdrawn from the "anus" (Fig. 7 b), the integrity of the rings is controlled, one of which still fast tightened from the "tie" (Fig. 7 c). Opening the rubber "rectal" pipe it is possible to direct control the correct result of the anastomosis (Fig. 7 d).

## Discussion

With such simulation the complete efficaciousness of the "grasping tie" has been demonstrated in tightening in very

reliable mean the slipknot of the nylon ribbon – (the "tie") – around the stapler axle above the "rectal stump" of a spongy rubber tube. In fact the "rectal" stump of the tube results completely fastened to the axle of the stapler under the tightening of the nylon slipknot, without the possibility of any manual displacement, neither before the connection of the stapler head to the anvil nor after the extraction of the tool after completing the mechanical anastomosis, checking so the complete fixity to the metallic axle of the ring of spongy rubber on which the nylon "tie" is tightened.

The handiness of the grasping consents of address the apposition of the nylon ribbon already formatted as slipknot exactly in the chosen point of the "rectum" operating by the handle, and then by remote activation of the lever of advancement on the handle itself. The other lever is efficacious and precise in the driving of the blade and cut the tail of the ribbon after the completion of the tightening of the "tie".

## Conclusion

The need of a tool able to fix with complete confidence a tract of the gut on the axle of a circular stapler -head or anvil - in the preparation of a mechanical circular anastomosis, and able in the meanwhile to operate also in very narrow anatomical spaces as in the deep pelvis or among the pillars of diaphragm, were the spring for planning and realize the first prototype of grasping tie. The tool was then designed to facilitate the mechanical stapler suture after total gastrectomy or low rectal resection. With the experience of simulation above illustrated the last needs seems completely obtainable. The negligible dimensions of the operative end of the grasping and the handiness of the entire tool promise to fulfil also the other fundamental requiring.

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