江苏扬子江医疗科技股份有限公司
JIANGSU YANGTZE RIVER MEDICAL TECHNOLOGY CORP.

# Silicone wound drains system

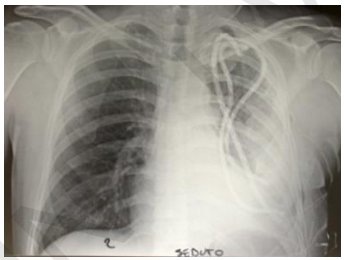
# Silicone wound drains

- The post-op wound drains are used after surgery in order to evacuate fluids which may accumulate and could become a focus of infection or retained blood complications.
- Perforated or fluted wound drains are inserted in the wound itself, the wound is then sutured and the drain is hooked to gravity collection bags or to negative manual suction bulbs.
- The time of use depends on the type of post-op surgery, but in general, the timing is between 2 to 4 days.

# CLINICAL TARGET

ENT & Maxillofacial

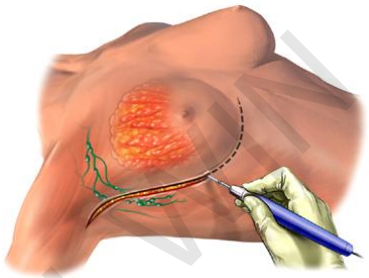
Cardio and Thoracic



Abdominal

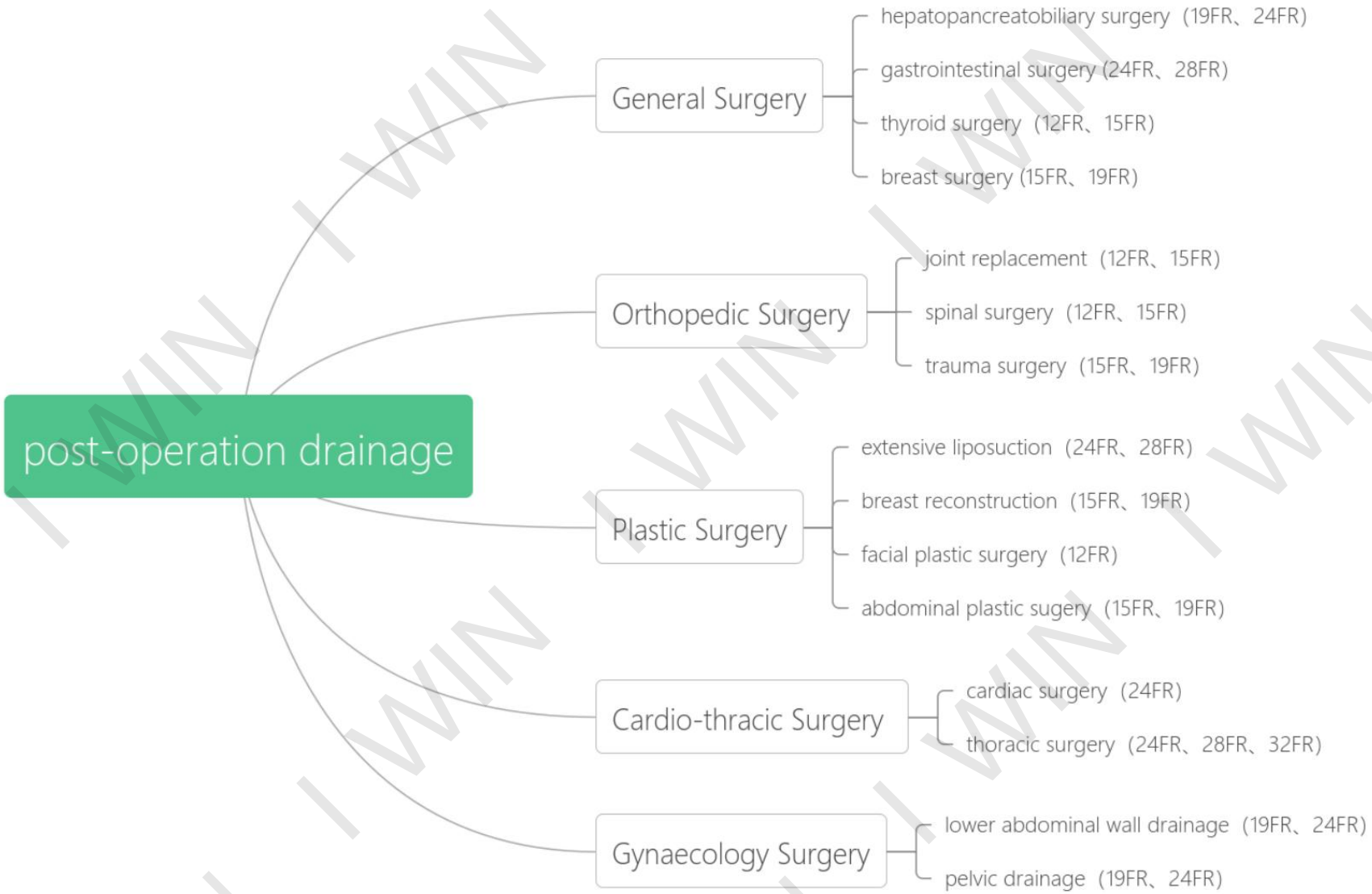
Neurosurgery

Mastology




Orthopedic

# CLINICAL TARGET



# **Silicone**: the benefits

- The wound drains use transparent silicone medical grade material which allows controlling liquids evacuations visually.

## SILICONE vs. PVC

1. Better biocompatibility with human tissue and blood, if compared with PVC.

2. Silicone offers better elasticity than PVC, used in drains improves milking them which helps preventing drain occlusions.

3. Silicone is biologically inert and non-allergenic thus doesn't favour bacteria growth as PVC does.

# Silicone: the only way to go!

**A Comparative Assessment of Three Common Catheter Materials**

Jim Curtis

Paal Klykken

Dow Corning Corporation

1. [...Silicones, well known for the their intrinsic biocompatibility and biodurability.....Silicone catheters are stable.... The elasticity of the elastomers reduces tissue stress…]

2. [...The addition of Chemicals known as plasticizers is necessary to make PVC Soft and flexible. There additives – DEHP Phtalates - can be extracted in-vivo causing several problems...]

3. […The biocompatibility of silicone polymers is in general due to their chemical stability, their low surface energy and their hydrophobicity... The silicone offer substantial benefits, as demonstrated by the study of tubings used during heart surgery.]

13 – F. BRIQUET, M.F. HARMAND, C. ISETTA, *Comparative assessment of the biocompatibility of 4 types of tubing for cardiopulmonary bypass*, 16th annual San Diego Cardiothoracic Surgery Symposium, 1996.

14 – C. ISETTA, C. MERVILLE, R. HECHEMA, P. PHILIP, J. BAYLE, F. BRIQUET, TH. CHEVALIER, B. SANCHEZ, J. JOURDAN, *Biocompatibility study of four materials (PVC, Heparin coated PVC, Silicone Platinum, Silicone Peroxide) used in the production of cardiopulmonary by-pass tubes until day 7 after surgery*, 16th annual San Diego Cardiothoracic Surgery Symposium, 1996.

# Why Yangtze Silicone safer ?

Hardness （Shore A)

60 ± 3

Yangtze River

≥68

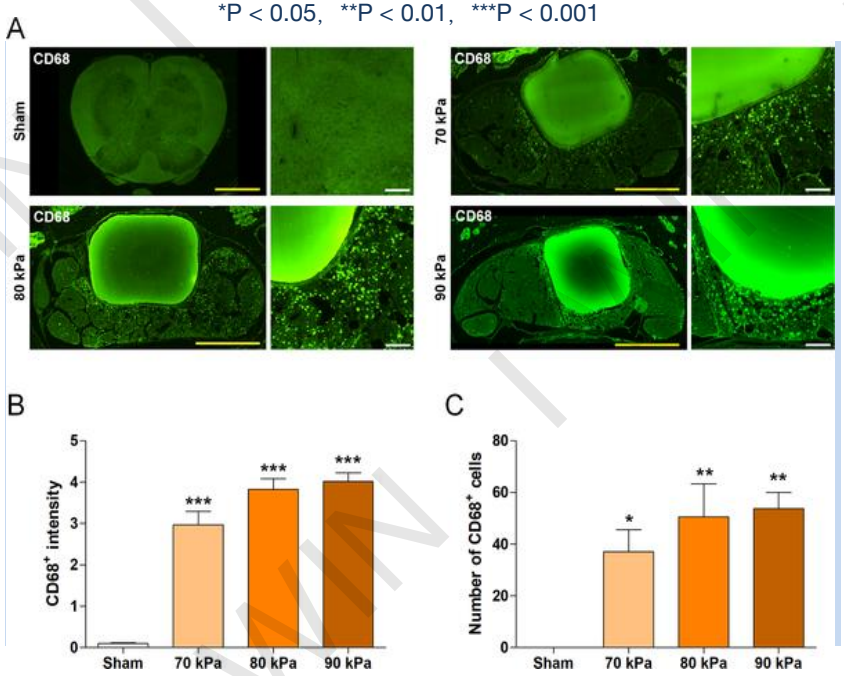
Competitor

Conclusion

**The harder silicone is, the more pressure it puts on the tissue. the higher pressure on the tissue, the more inflammatory cells in it.**

The relation test between silicone hardness and inflammatory cell （n=4)

*P < 0.05, **P < 0.01, ***P < 0.001




*Kim H, Hong JY, Jeon WJ, Lee J, Ha IH (2021) Evaluation of the effects of differences in silicone hardness on rat model of lumbar spinal stenosis. PLOS ONE 16(5): e0251464.*

# Silicone Drains – Perforated

**Jackson-Pratt® “like” drains**

**Round shape drains**

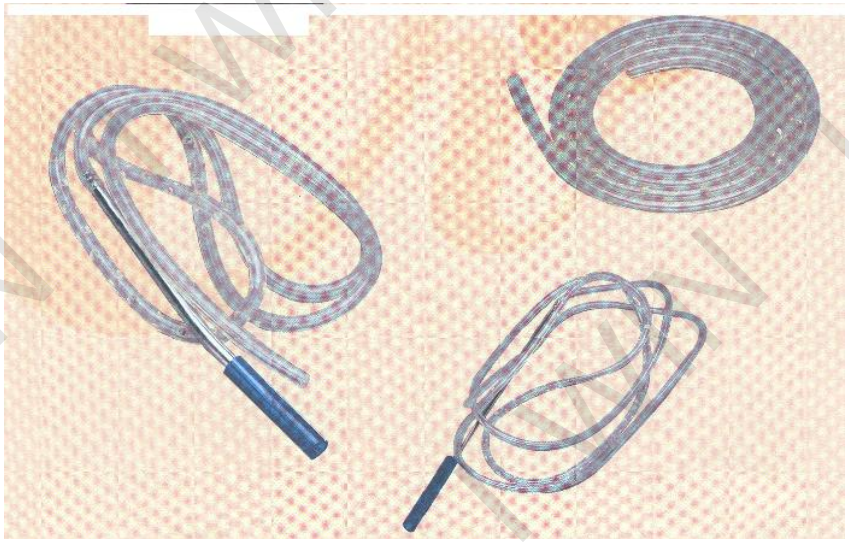
First drain evolution from PVC drains, and were developed to support surgery evolution like laparoscopy.

Holes are misaligned in order to improve the draining capabilities and to reduce the risk of clotting

Inner ribbing helps prevent drain collapsing and clogging to assure an high flow drainage

# “JP like” Competitors

CareFusion



CardinalHealth

Degania Silicone

BIOMETRIX

ETHICON INC.
a Johnson & Johnson company

- Yangtze drains perform better than competitor because the drain holes are misaligned allowing for a better drainage
- Inner ribbing helps prevent drain collapsing and clogging to assure an high flow drainage
- incomplete catalogue: the companies above are not 100% focused on drainage as Yangtze does

# The evolution of the silicone drains

Two new Yangtze products for better drainage in clinical usage

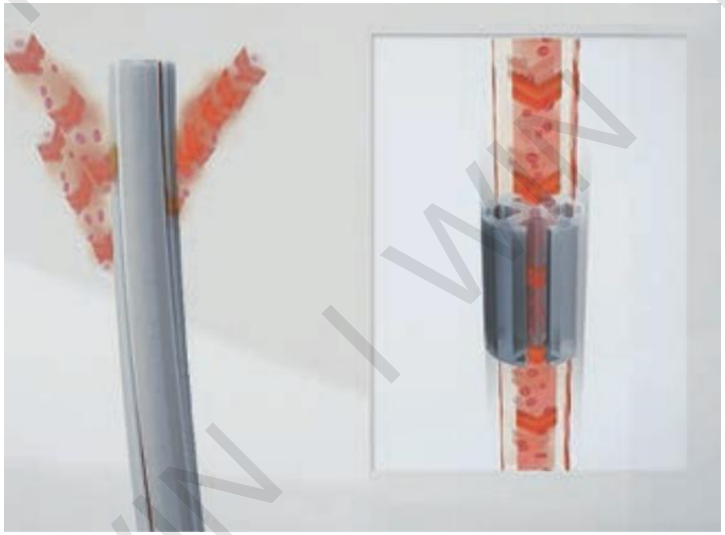
**Fluted Drain**

**Spiral Drain**

# Fluted drains – Yangtze River

## Why use fluted drains?

- Fluted drains use capillarity as drain effect which allows a quicker fluids drainage reducing blood clot formation.
- The fluted shape ensures a high draining area if compared with perforated drains.
- Fluted drains reduces the risk of adhesion in body tissue making them easier to remove after patient recovery.



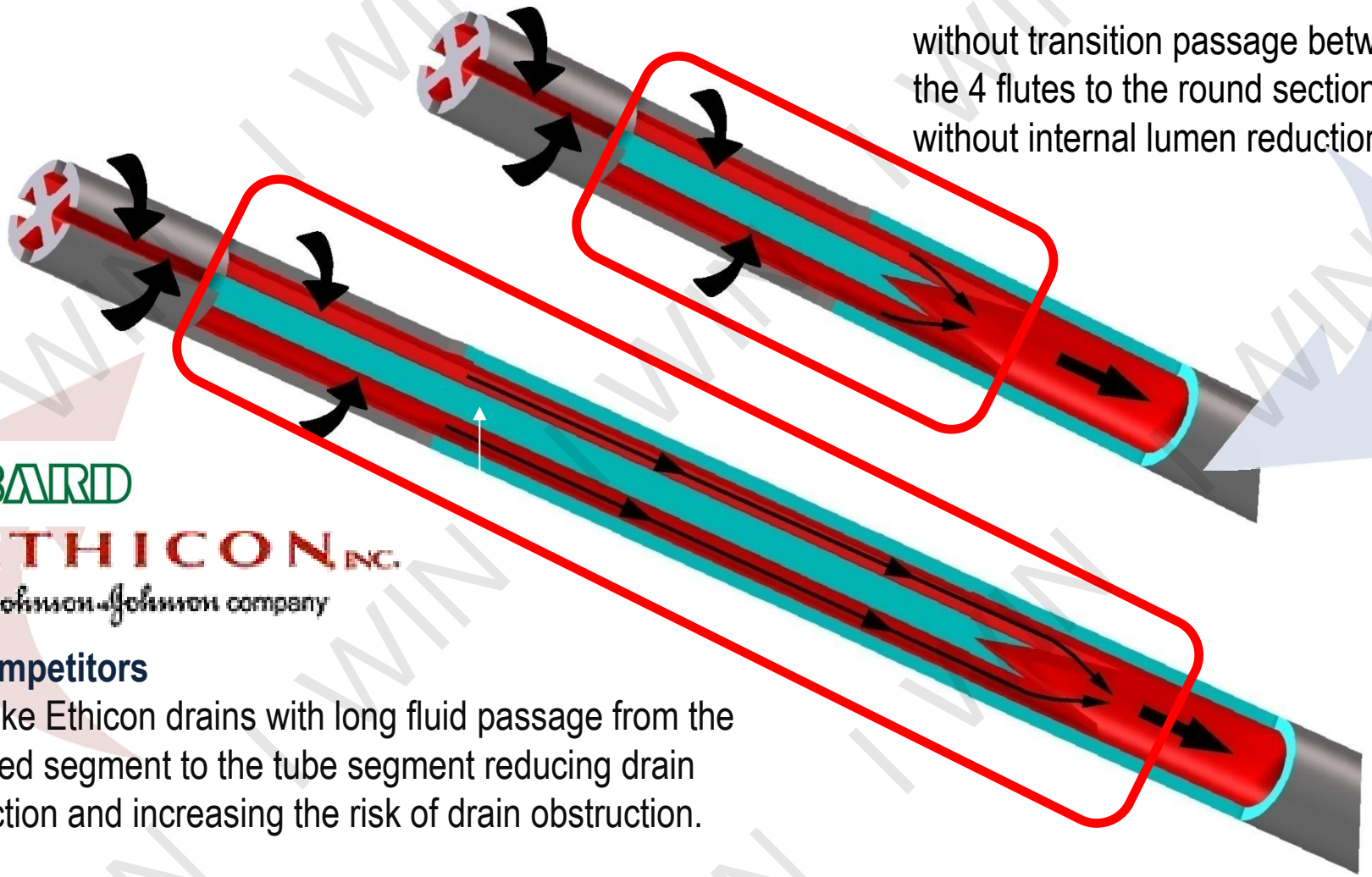
**Draining Surface**

| Fluted Drain | | Perforated Drain | |
|---|---|---|---|
| CH/Fr 10 | 720 mm² | CH/Fr 10 | 62 mm² |
| CH/Fr 15 | 1.092 mm² | CH/Fr 15 | 99 mm² |
| CH/Fr 24 | 1.560 mm² | CH/Fr 24 | 184 mm² |

# Fluted drain vs. Blake drain

## Fluted Drain

without transition passage between the 4 flutes to the round section without internal lumen reduction.



BARD

ETHICON INC.

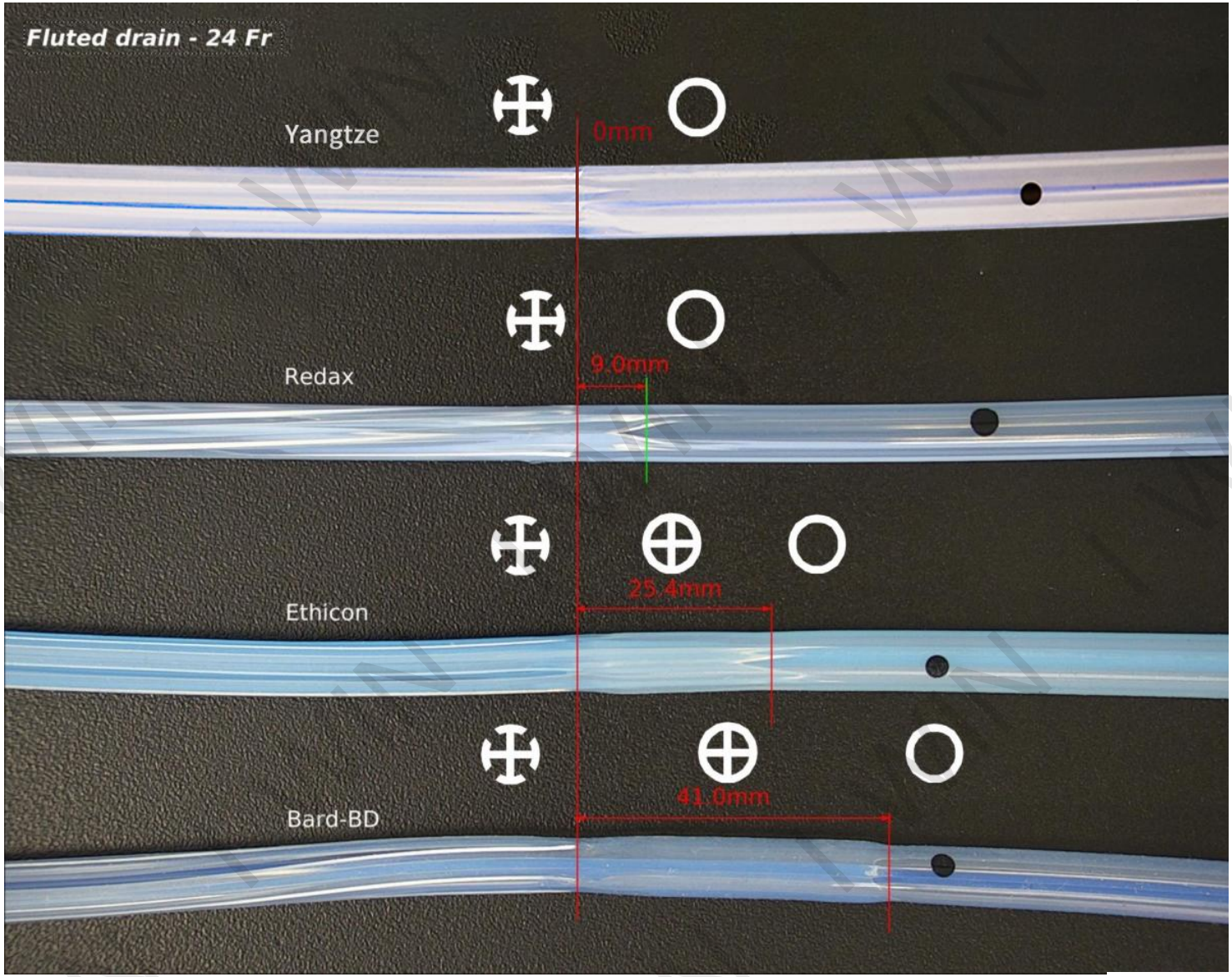
a Johnson & Johnson company

**Competitors**

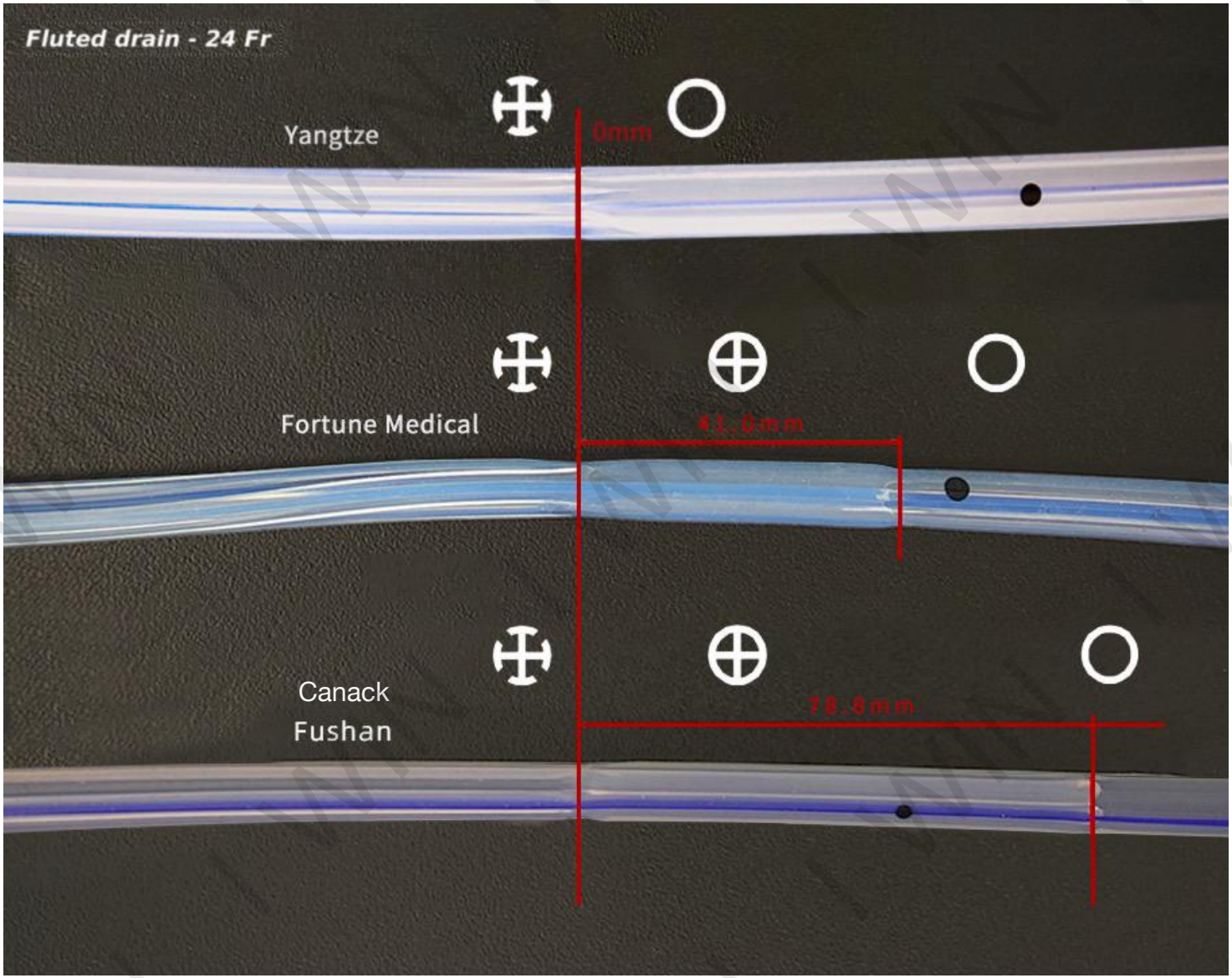
Blake Ethicon drains with long fluid passage from the fluted segment to the tube segment reducing drain section and increasing the risk of drain obstruction.

IOWIN

# Fluted Drain vs Main Competitors



# Fluted Drain vs Main Competitors (China )

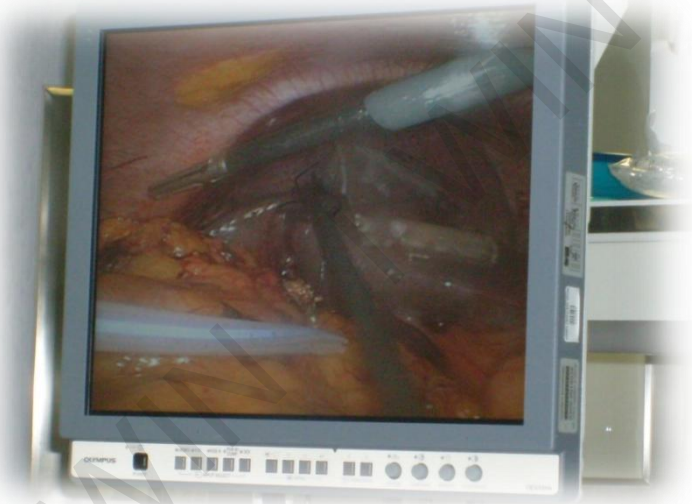


# Fluted Drain vs Main Competitors

Flow rate test : ISO 20697:2018 (Annex G)

| Drainage type | Flow rate [ml/min] |
|---|---|
| Yangtze Fluted 19 Fr | 460 ± 25 |
| J&J Blake 19 Fr | 400 ± 25 |
| Bard Channel 19 Fr | 380 ± 25 |

# Fluted Drain: clinic applications



## Fluted Drain

Fluted Drains can be used in any post-surgery drainage procedure. Particularly:

- Laparoscpic and minimally invasive surgery.
- Plastic surgery, aesthetic & reconstructive surgery.
- Vascular and cardio surgery.
- Orthopedic and trauma.
- Abdominal surgery.

# The drain evolution: Spiral Drains

# Spiral Drains: advantages

## Spiral Drain

**Why use Spiral drains?**

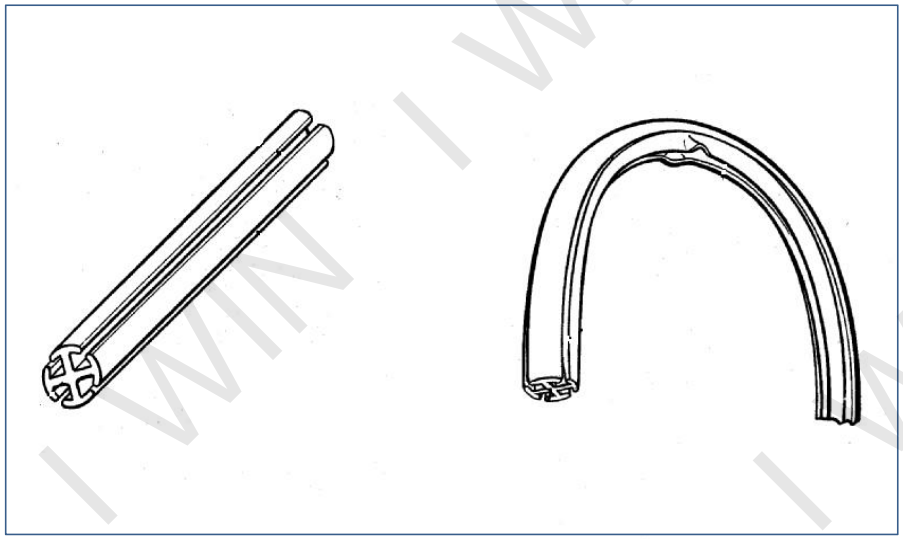
- Drain by capillarity in any position.
- Allow for a regular and constant drain preventing traoumas on the internal tissues.
- Spiral canals increase drainage speed and flow, if compared against standard fluted drains.
- Spiral Drain allows a very complex positioning inside the wound for increased precision and patient comfort.

| Spiral Drain | | Standard Drain | |
|---|---|---|---|
|  | Draining Surface ($mm^2$) |  | Draining Surface ($mm^2$) |
| CH 12 | 1054 | CH 12 | 36 |
| CH 15 | 1390 | CH 15 | 45 |
| CH 19 | 1612 | CH 19 | 168 |
| CH 24 | 2280 | CH 24 | 331 |

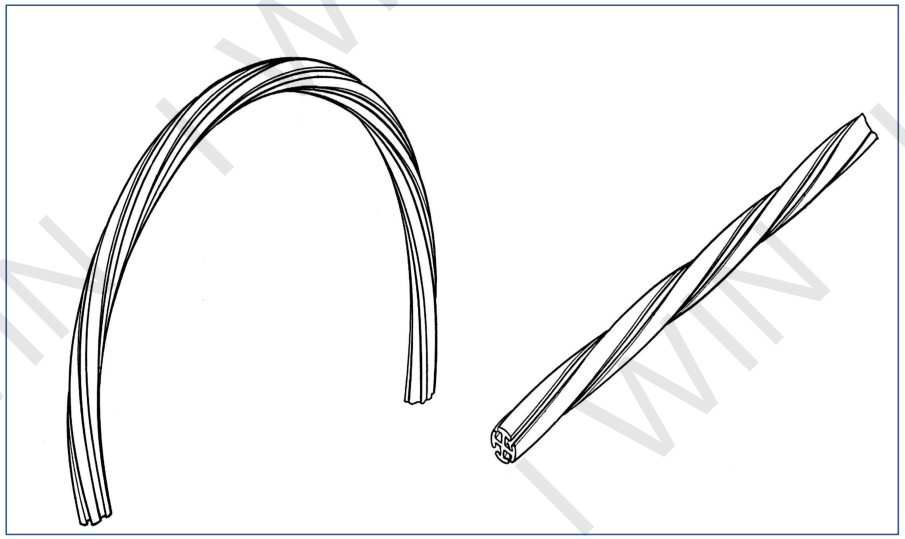
# Spiral Drain: Concept

**COMPETITORS**

**Standard fluted**



**Spiral**



- Standard fluted drains tend to expand channels when curved generating a loss of capillarity.

- Even if bended the Spiral Drain remains active.
- Spiral Drain allows to use smaller diameter drain if compared to standard fluted drains.

# Spiral Drain vs Main Competitor


***WHAT ARE THE YANGTZE BENEFITS?***

NO risk of breaking： Yangtze River's extrusion technology, has ajunctionless structure which allows direct transfer of fluid from the fluted to round profile without the risk of breaking.

NO pain： From the fluted section to the round section is one-step formed, and outer diameter of the tube keep same, ensuring patient has no pain to remove the drain.

# Spiral Drain: clinical applications

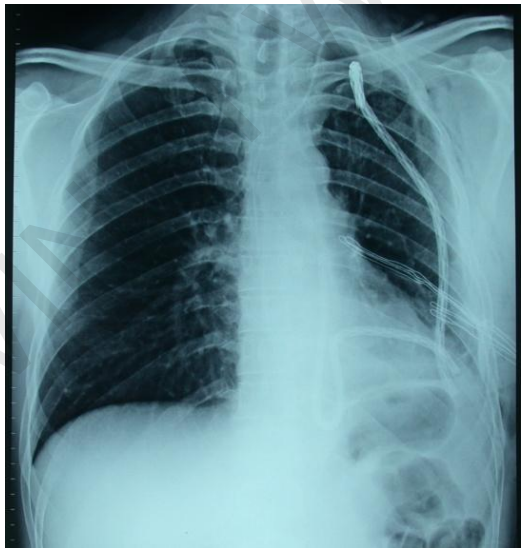
## Plastic surgery

- brest reconstruction
- Abdominoplasty

## General and Vascular surgery

- Bariatric
- Mastectomy
- Oncology
- Laparoscopic

## Orthopaedics



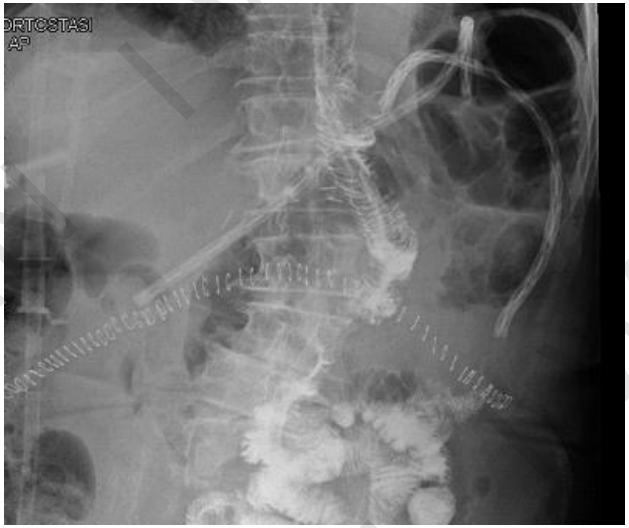
## Cardio surgery

- Valvular intervention
- Mediastinum and pericardium
- Video Assisted Toracoscopy
- Non-invasive

# **Spiral Drain**: clinical target

Example 3: Subhepatic drain enlarged to the mesogastrium (Pancreatic Surgery)

Example 1: Diverting Ileostomy (Low Rectum)



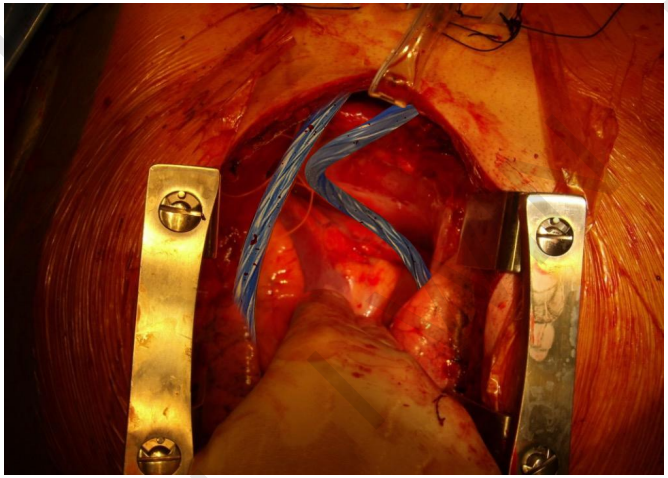
Example 2: Left hypocondrium (anastomotic) in case of total gastrectomy

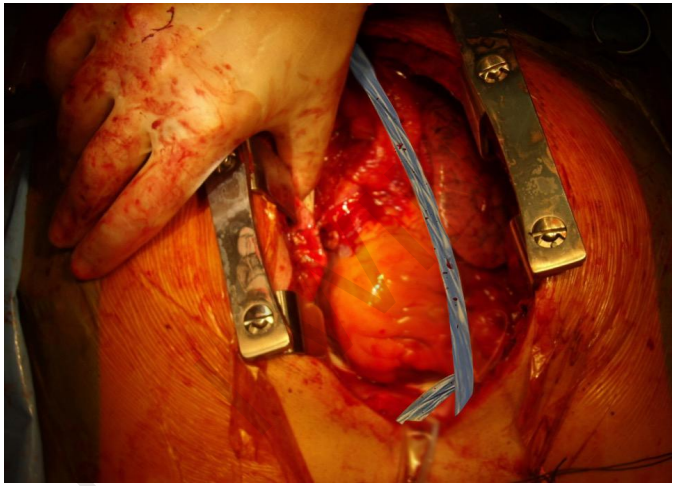
# Spiral Drain Features

- **The atraumatic profile and its intrinsic flexibility allow patient's comfort and reduce the tissue trauma**.

"... Although the conventional chest tube has been proven highly effective, it possesses unwanted features (large size and rigidity). In addition to providing a great degree of discomfort to the patient, the rigid conventional chest tubes may compress coronary structures and/or unsettle bypass grafts."

[*] *Svedjeholm R, Hakanson E.* - Postoperative myocardial ischemia caused by chest tube compression of vein graft., *Ann Thorac Surg* 1997; 64:1806-1808





# Flat Fluted Drains

## Characteristics


### *WHAT ARE THE YANGTZE BENEFITS?*

Similar application as Jackson Pratt™ , but with the advantages of the channels.

Flat type drains are differentiated by a single extrusion profile, unique on the market.

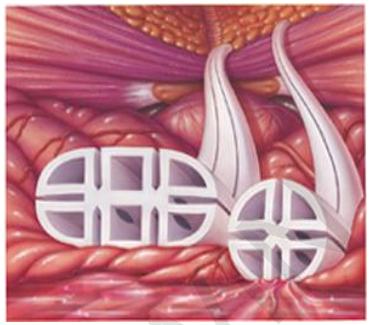
Easy to remove the tube after the patient recovery .

# Competitors – Fluted Drains Range

- Nobody can offer One-step molding spiral profile

- Transfer from Fluted to Round profile is not immediate, with important drainage flow strongly reduced and risk of occlusion increased.

ETHICON INC.
a Johnson&Johnson company



CareFusion

- Most of competitors offer lower qual channel design with risk of kinking.

REDAX®

- Limited range: 10,12, 15, 19, 24,28,32 Fr

BARD

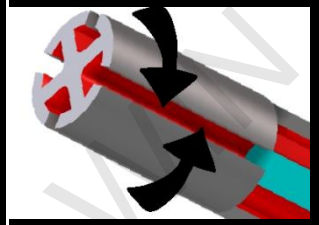
FORTUNE

Degania Silicone

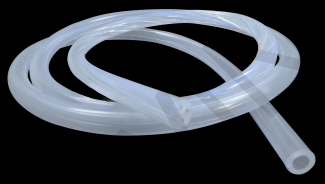
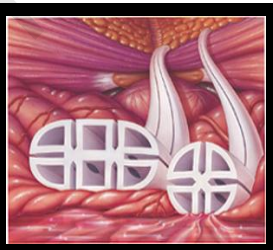
BIOMETRIX

I WIN

# Fluted Drain Competitors

| | | | | |
|---|---|---|---|---|
| |  |  |  |  |
| | IWIN | ETHICON INC. a Johnson & Johnson company | BARD | CardinalHealth™ |
| BRAND NAME | Fluted DRAIN | BLAKE™ DRAIN | BARD© CHANNEL | Jackson-Pratt® |
| Space between drainage and connecting tube | None | Extreme | Extreme | Extreme |
| **Risk of blocking** | **NO** | **YES** | **YES** | **YES** |
| **Drainage Flow** | **High** | **Low** | **Weak** | **Weak** |
| Drain adapter | YES | YES | NO | NO |
| Sizes: | 10, 12, 15, 19, 24, 28, 32 Fr | 10, 15, 19, 24 Fr | 10, 15, 19, 24, 28, 32 Fr | 10, 15, 19, 24 Fr |

# Spiral Drain Competitors

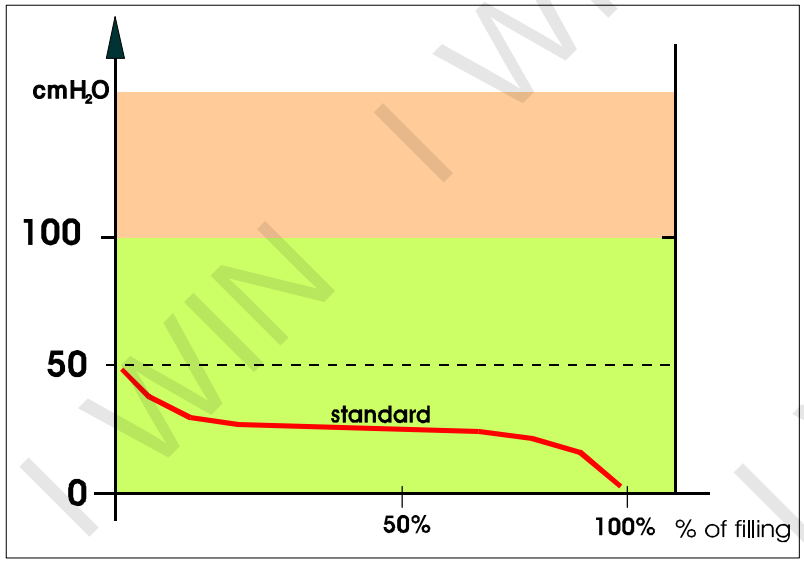
| |  |  |  |  |
|---|---|---|---|---|
| Brand Name | SPIRAL DRAIN | KARDIA SPIRAL | HEMADUCT™ | HEMADUCT™ |
| Version | Total fluted spiral profile | Total fluted spiral profile | Straight fluted profile | Fluted with internal lumen |
| **Spiral design** | **YES** | **YES** | **NO** | **NO** |
| One-step molding | YES | NO | NO | NO |
| **Drainage Flow** | HIGH | LOW | WEAK | WEAK |
| Cardio-Thoracic | YES | YES | NO | NO |

# Yangtze Silicone Bulb Evacuators

- The 200ml/400ml bulb evacuators can be accessed with two different drains, which is necessary on around 50% of the surgical procedures.
- Bulb shape and clear silicone surface allow for easy measure of the fluid quantity and identification of the fluid type, allowing better patient monitoring.
- A complete range of products:100, 200, 400 ml.
- Complete range with additional drainage bag securely connected on the evacuator bottom
- Anti-reflux valves protect patient from accidental return fluid or air

# Yangtze Silicone Bulb Evacuators

## Very gentle and constant suction!





I WIN silicone bulb permits a gentel and constant of aspiration , with gradual and complete filling of reservoir in order to fully exploit its collection capacity.

# Yangtze Closed Wound System


**Competitors**


## *WHAT ARE THE YANGTZE BENEFITS?*

- **NO need for a constant patient monitoring: even if the bulb is full the fluid keep going into the drainage bag allowing a continuous wound drainage.**
- **NO biological hazards: nurses do not need to empty the drainage bag, exposing themselves to biological infections, they just need to change the drainage bag and activate the bulb evacuator.**
- **NO bruises risk: even if the bulb is full the fluid keep going into the drainage bag allowing a continuous wound drainage.**

IOWIN

# Competitors

| Brand Name | Yangtze (China) | JACKSONPRATT™ (USA) | BARD (USA) | J-VAC™ (USA) | Mini Snyder (USA) |
|---|---|---|---|---|---|
| Type of reservoir: | Silicone bulb | Silicone bulb | Silicone bulb | Silicone bulb & suction bag | Silicone bulb |
| Closed system with drainage bag | YES | NO | NO | NO | NO |
| Bulb evacuator capacities | 100, 200, 400 ml | 100, 400 ml w. or w/o. drainage bag | 100 ml only | 100 ml bulb. Rigid bag: 150, 300 and 450 ml | 100 ml only |
| Double drain access | YES: 200 ml | Only on 400 ml | Only on 150/400 ml | NO | NO |
| Drain compatibilty | Can use any drain combination | Only original type Jackson Pratt™ | Can use any drain combination | Can use any drain combination | Can use any drain combination |

# Great opportunity with Yangtze Drains

## SPIRAL DRAINS

No  competitors with Spiral profile: still a unique product.

Well reconized as “the best drain” available in the market.

## FLUTED DRAINS

A valid solution for all clinical use.

Offer a good contact with surgeons to generate new business.

A very top quality offer:

Competitive price with stable delivery time.

## Now run to Sell!