GLUBRAN®2

# The gentle power of a drop.

**Class III medical device, synthetic, CE certified for surgical and endovascular use**

GEM SOLUTION COMES FROM EVOLUTION.

# Summary

# SUPPORTING THE SURGEON, WITH BETTER RESULTS FOR PATIENTS.

## 25 years sustaining surgery.

The evolution of GEM derives from its continuing commitment to research and efforts to improve products and demonstrate their effectiveness and quality, not only through the contribution of our expert professionals, but also through clinical studies on the most innovative devices.

ADHESIVE

SEALANT

HEMOSTATIC

BACTERIOSTATIC

SCLEROSING

EMBOLIZING

# A REVOLUTION, IN A DROP.

## Glubran 2 for minimally invasive surgery.

- Versatile, polymerizes quickly in contact with tissue and in a moist environment [59,98,100,159]
- Creates a thin, elastic, breathable film, firmly adhering to tissues or prosthetic materials [2,7,30,65,84,91]


**UNIQUE FORMULA commercially available**

**A second generation product modified by the addition of a monomer**

**N-Butyl 2 Cyanoacrylate (NBCA)+ Methacryloxysulfolane (MS)**

# SIX PRODUCTS IN ONE DROP.

## SIX properties in ONE SINGLE product, for over 80 surgical indications.

### ADHESIVE

High tensile strength: the minimum acceptable load is 435 N [approx. 18 kg/cm2]. [1,2,13,16]

### SEALANT

Applied using dedicated nebulizers, it forms a thin film with sealing and waterproofing properties, thanks to its synthetic nature and high adhesive power. [2,27,30,64-68,77,88,91,106-108]

### HEMOSTATIC

Reacts with blood, even when uncoagulated, inducing "mechanical" hemostasis at the site of bleeding. [7,62,63,95-97-116-119,121-127,131-134]

### BACTERIOSTATIC

Inhibits bacterial proliferation for an average of 7 days. [1,5,7,10,11,28, 34,76,115]

### SCLEROSING

Injected into the lumen of the vessel/varix, it polymerizes, generating local thrombosis and resulting fibrosis and sclerosis. [5,113,128-132,135]

### LIQUID EMBOLIZING AGENT

Injected into the blood vessel it polymerizes, forming a tight-fitting mold to the walls of the vessel and occluding it. This generates a definitive occlusion, equivalent to a surgical ligature. [3,6,77,87,110,118,121,125,134,137-190]


Pediatric surgery
Plastic Surgery
General surgery
Thoracic surgery
Urological surgery
ENT.
Sealant
Adhesive
Gynecological surgery
Vascular surgery
Bacteriostatic
GLUBRAN 2
Hemostatic
Cardiac surgery
Neurosurgery
Embolizing
Sclerosing
Radiology, Neuroradiology, Cardiology Interventional
Digestive endoscopy

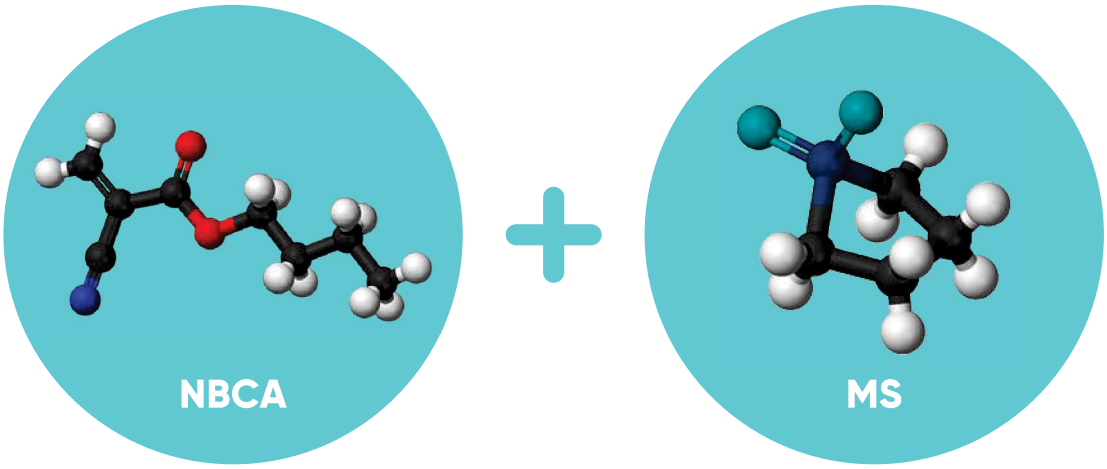
# When it makes a difference.

# A GREAT ADHESIVE AND EXCELLENT BACTERIOSTATIC SEALANT.*

- It also interacts and reacts with liquids other than blood: serum, lymph, gastric and pancreatic juices, bile, saliva, urine.
- Reacts with blood, even when uncoagulated, inducing "mechanical" hemostasis at the site of bleeding . [63-84,95,98-109,197]
- Hemostasis is ensured, even in anticoagulated patients or in patients with hereditary coagulopathies. [103,143,146,161]

*1,2,5,7,10, 11,13,27,28,30,34,64-68,77,88,91,106-108,192

# RELIABLE BIOCHEMISTRY.




Appearance

**TRANSPARENT**

Smell

**TYPICAL OF CYANOACRYLATES**

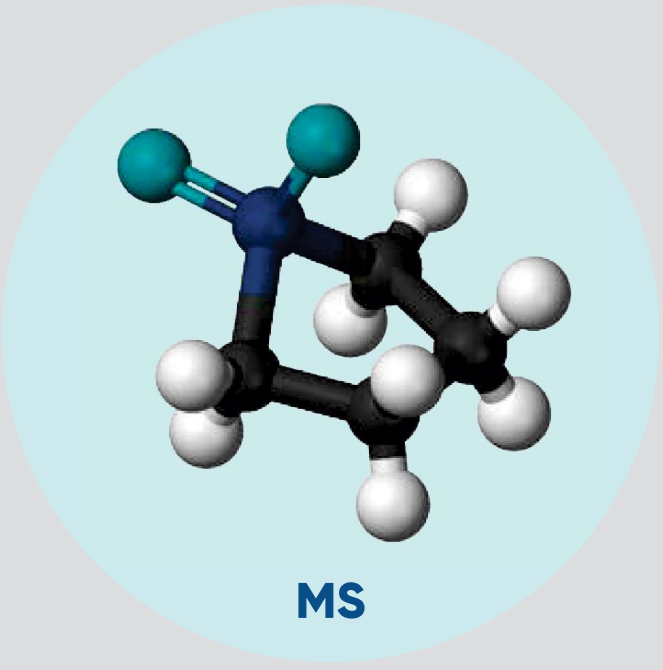
Density

**SIMILAR TO WATER** [1]

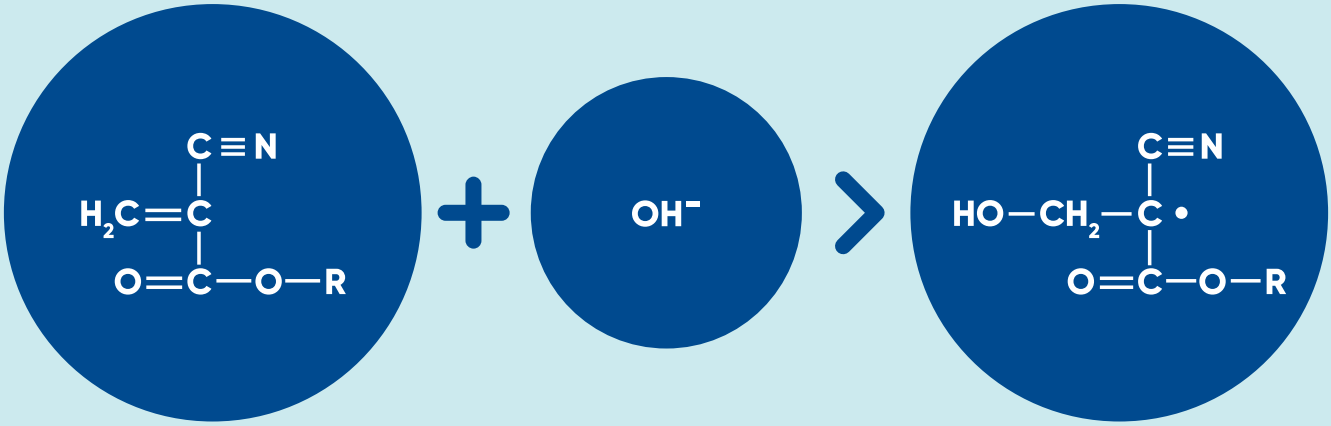
- **Ready to use** [1,7,35,37,196]
- **Does NOT polymerize in the presence of air** [142]
- **Storage between +2 and +8 °C**
- **Can stay at room temperature (22.5+/-2.5 °C) for 48 hours** [1]
- **Effective in moist environment** [1,59,98,100,159]

The advantages of MS:

- Polymerization temperature: 45 °C, much lower than 80-90 °C typical of pure monomeric cyanoacrylates [6,8,59, 98,100,159]
- Biocompatibility [1,2,5,7,200]
- NO tissue necrosis [3,7,6,172]
- Elasticity of the film at the end of polymerization [2,7,30,65,84,91]



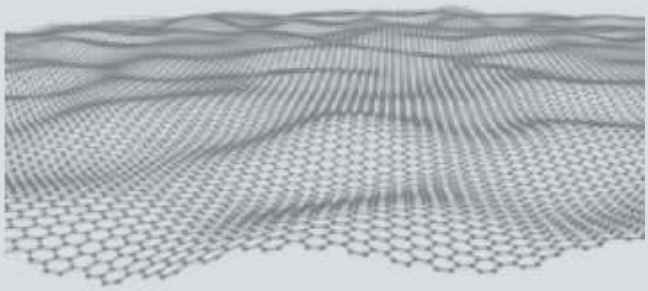
## POLYMERIZATION [192,194,198]






In:

- **Moist environments and tissues**
- **BLOOD or OTHER BODY FLUIDS (serum, lymph, gastric or pancreatic juices, bile, saliva, urine)**
- **Polymerizes after 1-2 seconds, complete after 60-90 sec**



- During polymerization a thin, elastic film is formed that adapts to the anatomy of the tissues. [106-108]
- At the end of polymerization, the surface of the film is no longer adhesive. [8]

NOTE

**Distilled water/glucose/mannitol do not activate polymerization** [3,7,6,172]


Zero
residue,
zero traces.

# A BIODEGRADABLE FILM.

## HYDROLYTIC DEGRADATION

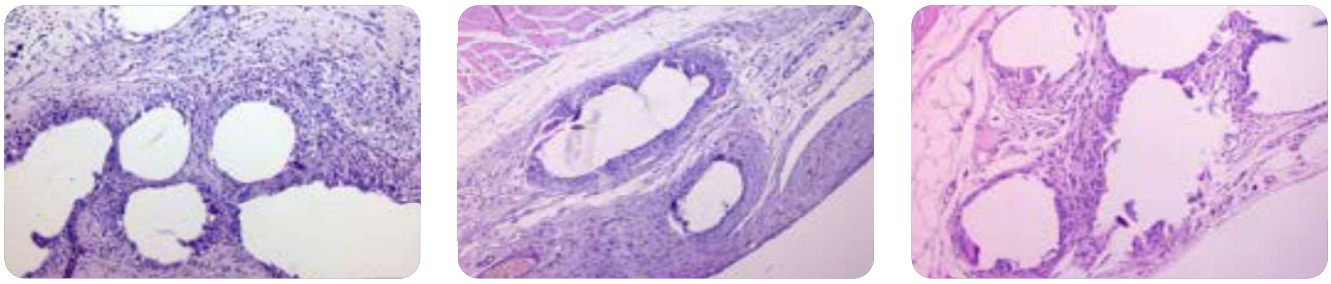
Carboxylesterases circulating in the blood BIODEGRADE Glubran® 2 by means of hydrolytic mechanisms, in a period ranging from 15 days to 6 months.

The degradation products are excreted from the body through the kidneys and pulmonary excretion. [65]

In more vascularized tissues, elimination is faster. [55,200]

**Glubran® 2 does not stop the healing and tissue regeneration process.**

The same newly formed tissue cells penetrate the film of Glubran® 2 and continue to colonize it and reproduce, until it is eliminated. [55,200]



**7 DAYS** | **15 DAYS** | **30 DAYS**

Histological samples of abdominal wall cross-sections of rats undergoing hernia repair with prosthesis fixation using Glubran® 2. Interaction between prosthetic mesh fibers and host tissues at 7, 15 and 30 days after surgery (Modified by Poli et Al. 2019). [200]

# A DROP OF SAFETY.*

## BIOCOMPATIBILITY TEST [1]

- Cytotoxicity
- Genotoxicity
- Mutagenicity

## TISSUE TESTS [1]

- Intracutaneous reactivity on rabbit
- Allergic sensitization on guinea pig
- Muscle implantation test in rabbit

## RESULTS

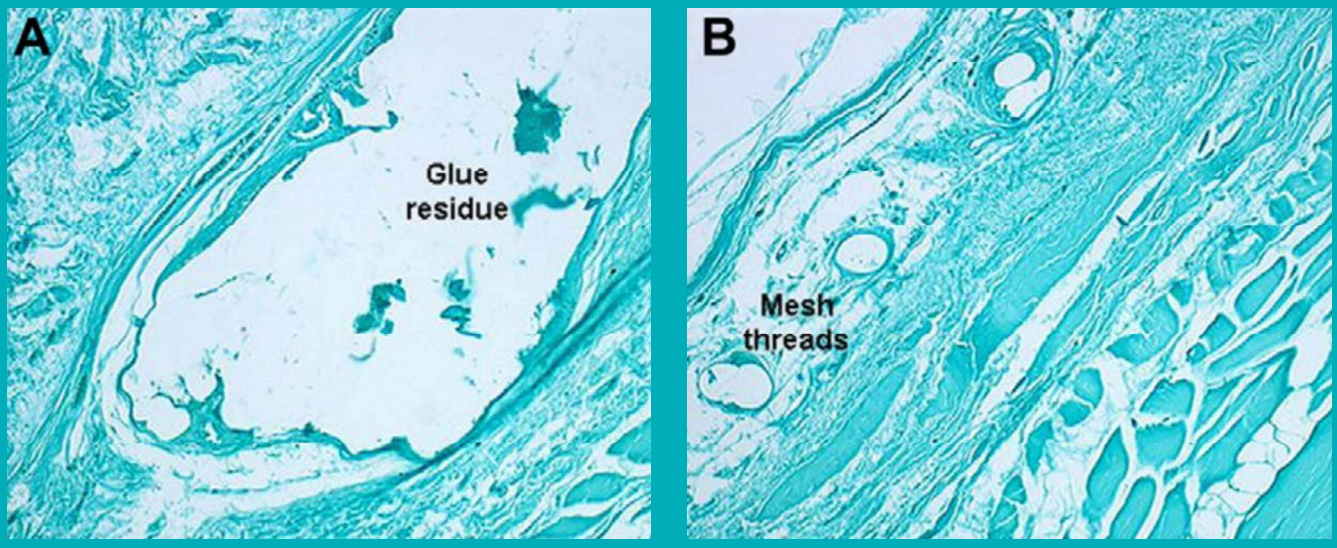
The product causes moderate inflammation, typical of foreign body reactions such as suture threads [1,7,200]

NO chronic inflammation [1,3,6,7,200]

**Once polymerization is complete, Glubran® 2 behaves like an INERT BIOMATERIAL** [1,2,7,27,78,202]

- Over 2 MLN treatments
- 25 years of safety
- Over 200 publications

*52,161,166,192,194,201




**"Cyanoacrylate surgical glue as an alternative to suture stitches in fixing meshes for hernia repair." [7]**

- **... No PMN (PolyMorphoNucleated), necrotic cells or apoptotic cells were observed.**
- *"...when cyanoacrylates with longer alkyl chains (longer degradation) were finally synthesized, these began to be used clinically without histotoxicity..."* [192]

# Constantly evolving solutions.


**1 ml / 0.5 ml / 0.25 ml**

**10 sterile single-dose aluminum blister packs**

**Shelf life 2 years**

# CUSTOM APPLICATIONS.

## Wide range of dedicated applicators.

### Devices for drop-by-drop applications

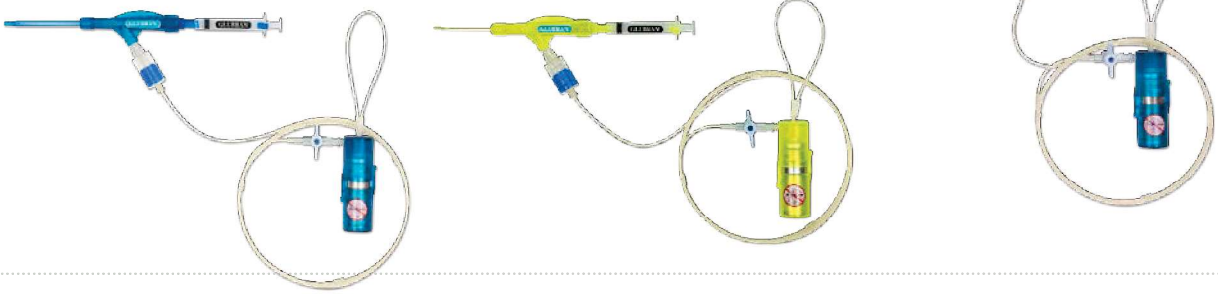
### Tip for thin linear application

### Laparoscopic catheters for drop-by-drop application

### Nebulizers for:

#### Laparoscopy

#### Laparotomy



### GLUTACK

**Laparoscopic atraumatic fixing device for hernia prostheses**

# AS A BACTERIOSTATIC SEALANT

## GENERAL SURGERY

### To prevent and reduce

Micro-leakage and extravasation of fluids with consequent formation of fistulae, seromas and lymphorrhoea.

### To seal

- Anastomosis (vascular, gastrointestinal, biliary, urological) [2,5,7,29,192,194]
- Sutures [7,9,19,26,28,43,47,66,85]
- Manual and mechanical resection lines [15,63-66,82,106]
- Resection surfaces of parenchyma and organs (liver, kidneys, pancreas, spleen, lungs) [69,70,81,82,85,86,91,95,97,192]
- Surgical cavities following removal of organs or tumor masses [74,84,94,97]

### To treat

- Fistulae (biliary, anal, perianal, urinary, pharyngeal, liquoral, bronchial, pleural, esophageal, tracheoesophageal, gastric, gastrointestinal, duodenal and pancreatic) [22,32,75-80,88,90,92,99,110-115]

## LIVER SURGERY

### To prevent

The formation of bilomas and biliary leaks after liver surgery and cholecystectomy [81,82,152,159]

## THORACIC SURGERY

### For aerostasis

Pulmonary resection interventions, lobectomies, pneumonectomies, bullectomies, volume reductions, tracheobronchial resections [85-92]

## NEUROSURGERY

### To seal

- Sutures of cranial and spinal dural plastic surgery in combination with other products (gauze, hemostatic sponges) [20]
- The transsphenoidal access of the Turkish saddle, for removal of pituitary adenomas [21]

## BREAST AND GYNECOLOGICAL SURGERY

### To close and seal

- Sectioned lymphatic vessels to prevent and reduce the formation of seromas and lymphorrhoea [84,94]

# AS A SURGICAL ADHESIVE

## SURGERY

### To fix

- Hernia prostheses [4,7,9,37-60,93]
- Prostheses in sacrocolpopexy [93]
- In vaginal, perineal, uterine plastic surgery [24-25]
- Omentum [106-108,204]
- Fabric patches (biological and synthetic) [6,12-14,27,61,105]

### To replace sutures in

- Repair of small epicardial lacerations [14-16,208]
- Timpanoplasty [24,25]
- Uvuloplasty [28]
- Circumcision, phimosis and frenulotomy [33-35,103]
- Closing trocar insertion points
- Surgical wounds [10,11,26,47,192,207,20]
- Dental surgery [22,26,27,193]

### To glue

- Damaged tissue [17,27, 205,206]
- Bone and osseocartilaginous fragments [207]
- Tracheoesophageal phonation valves

### To occlude

- Fistulae
- Ducts (billiary, pancreatic, etc.)
- Canals (lymphatic etc.) [22,32,75-80,88,90,92,99,110,115]

# AS A HEMOSTATIC

## FOR ALL TYPES OF SURGERY

- Blocks punctate bleeding
- Adheres firmly to hemorrhage sites
- Adapts to micro folds of tissues

## A simple and effective solution to achieve rapid hemostasis in [7,62,63,95-97-116-119,121-127,131-134]

- Injuries with punctate bleeding after oncological surgery with partial or total removal of an organ
- Resection surfaces of various organs (liver, kidneys, spleen, pancreas, lung)
- Vascular and cardiac surgical anastomoses (arterial and venous bypass, arteriovenous, prosthetic-vascular fistulae, aneurysm repair)
- Bleeding oropharyngeal surfaces
- Parenchyma tissue on lacerations, hemorrhagic lesions
- Cholecystic bed, bladder bed
- Ovarian cysts, myomectomies, hysterectomies
- Gastro-duodenal ulcers, with endoscopic injection into the submucosa

# AS A SCLEROSING AGENT

## The endoscopists assistant [110-190]

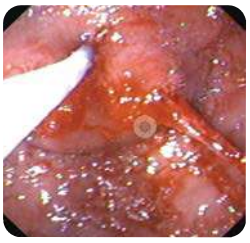
When injected into varices (Esophageal, Gastric, Duodenal) polymerizes and occludes the vessel, inducing sclerosis. [5,113,128-132,135]

### BLEEDING VARICES

1. Bleeding of Varices
2. Injection of Glubran® 2
3. Occluded Varix

Endoscopic treatment of gastric varices (Author Prof. G. Battaglia)

1.



2.

3.

# AS A LIQUID EMBOLIZING AGENT

## Interventional radiologists assistant (body and head-neck)

**[3,6,77,87,110,118,121,125,134, 137-190]**

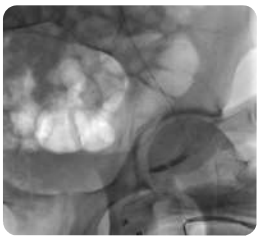
- Injected into the blood vessel, it polymerizes, forming a mold which adheres to the walls of the vessel, obstructing it and causing a definitive occlusion without recanalization.

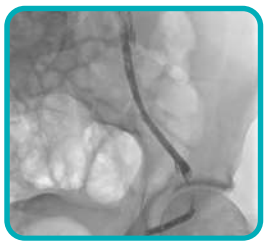
### VARICOCELES [142]

Pre-embolization

Microcatheterization

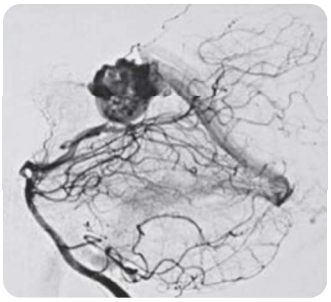
Post-embolization

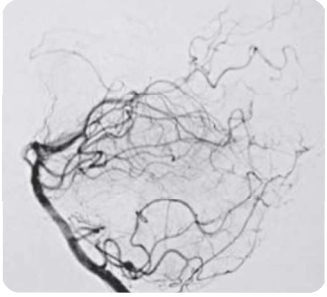


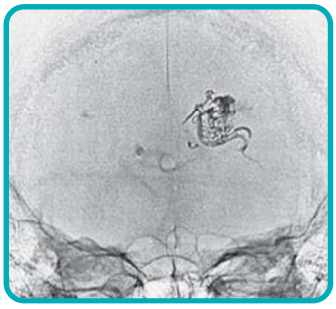


### AVM EMBOLIZATION [142,190]

Bleeding of AVM before and after injection of Glubran® 2 with complete obliteration and resolution.







# Bibliography


## General

1. Soldani G. Valutazione della Biocompatibilità del Dispositivo Medico Chirurgico di Classe III: Glubran® 2. Laboratory for Biomaterials & Graft Technology -Istituto di Fisiologia Clinica Del CNR Creas- Malattie Cardiovascolari e Discipline Affini; MASSA, Italy. 1998 Internal GEM data file.
2. Kull S, Martinelli I, Briganti E, Losi P, Spiller D, Tonlorenzi S, Soldani G. Glubran® 2 surgical glue: in vitro evaluation of adhesive and mechanical properties. J Surg Res. 2009 Nov;157(1):e15-21.
3. Levrier O, Mekkaoui C, Rolland PH, Murphy K, Cabrol P, Moulin G, Bartoli JM, Raybaud C. Efficacy and low vascular toxicity of embolization with radical versus anionic polymerization of n-butyl-2-cyanoacrylate (NBCA). An experimental study in the swine. J Neuroradiol. 2003 Mar; 30(2):95-102.
4. Schug-Pass C, Jacob DA, Rittinghausen J, Lippert H, Köckerling F. Biomechanical properties of (semi-) synthetic glues for mesh fixation in endoscopic inguinal hernia repair. Hernia. 2013 Dec;17(6):773-7.
5. Montanaro L, Arciola CR, Cenni E, Ciapetti G, Savioli F, Filippini F, Barsanti LA. Cytotoxicity, blood compatibility and antimicrobial activity of two cyanoacrylate glues for surgical use. Biomaterials. 2001 Jan;22(1):59-66.
6. Leonardi M, Barbara C, Simonetti L, Giardino R, Aldini NN, Fini M, Martini L, Masetti L, Joechler M, Roncaroli F. Glubran® 2: a new acrylic glue for neuroradiological endovascular use. Experimental study on animals. Interv Neuroradiol. 2002 Sep 30;8(3):245-50.
7. Losi P, Burchielli S, Spiller D, Finotti V, Kull S, Briganti E, Soldani G. Cyanoacrylate surgical glue as an alternative to suture threads for mesh fixation in hernia repair. J Surg Res. 2010 Oct;163(2):e53-8.
8. Ladurner R, Drosse I, Seitz S, Plitz W, Barbaryka G, Siebeck M, Bürklein D, Kirchhoff C, Buhman S, Mutschler W, Schieker M, Mussack T. Tissue attachment strength and adhesion formation of intraabdominal fixed meshes with cyanoacrylate glues. Eur J Med Res. 2008 May 26;13(5):185-91.
9. Dilege E, Deveci U, Erbil Y, Dinççağ A, Seven R, Ozarmagan S, Mercan S, Barbaros U. N-butyl cyanoacrylate versus conventional suturing for fixation of meshes in an incisional hernia model. J Invest Surg. 2010 Oct;23(5):262-6.
10. Howell JM, Bresnahan KA, Stair TO, Dhindsa HS, Edwards BA. Comparison of effects of suture and cyanoacrylate tissue adhesive on bacterial counts in contaminated lacerations. Antimicrob Agents Chemother. 1995 Feb;39(2):559-60.
11. Karatepe O, Ozturk A, Koculu S, Cagatay A, Kamali G, Aksoy M. To what extent is cyanoacrylate useful to prevent early wound infections in hernia surgery? Hernia. 2008 Dec;12(6):603-7.

## Cardiac Surgery

12. Gargiulo G, Pace Napoleone C, Solinas M, Frascaroli G, Pierangeli A. A new patch for the Norwood procedure. Ann Thorac Surg. 1999 Nov;68(5):1873-4.
13. Paéz JM, Sanmartín AC, Herrero EJ, Millan I, Cordon A, Rocha A, Maestro MA, Téllez G, Castillo-Olivares JL. Resistance and stability of a new method for bonding biological materials using sutures and biological adhesives. J Biomater Appl. 2005 Jan;19(3):215-36.
14. Gálvez-Montón C, Prat-Vidal C, Roura S, Farré J, Soler-Botija C, Llucià-Valldeperas A, Díaz-Güemes I, Sánchez-Margallo FM, Arís A, Bayes-Genis A. Transposition of a pericardial-derived vascular adipose flap for myocardial salvage after infarct. Cardiovasc Res. 2011 Sep 1;91(4):659-67.
15. Gomes WJ, Underwood M, Ascione R, Lloyd CT, Angelini GD. Treatment of delayed rupture of the left ventricle after mitral valve replacement. Arq Bras Cardiol. 2002 Nov;79(5):544-9.
16. Alamanni F, Fumero A, Parolari A, Trabattoni P, Cannata A, Berti G, Biglioli P. Sutureless double-patch-and-glue technique for repair of subacute left ventricular wall rupture after myocardial infarction. J Thorac Cardiovasc Surg. 2001 Oct;122(4):836-7.
17. Birdi I, Bryan AJ, Mehta D, Pryn S, Walsh C, Wilde P, Angelini GD.Left ventricular volume reduction surgery. Int J Cardiol. 1997 Dec 1;62 Suppl 1:S29-35.
18. Urbanski PP. When is total aortic arch replacement indicated in patients with acute aortic dissection. Med Sci Monit. 2002 Mar;8(3):CR165-8.
19. De Paulis R, Matteucci SL, Penta de Peppo A, Chiariello L. Cyanoacrylate glue as an alternative to an additional suture line in the repair of type A aortic dissection. Tex Heart Inst J. 1999;26(4):275-7.

## Neurosurgery

20. C. Formica, S. Francia, V. Lagorio, F. Vittoria, M. Formica, R. Bragazzi, M.C. Coccia. Meningioma spinale ossificante ad esordio subdolo. Giornale Italiano di ortopedia 2002; 28: 166-172.
21. Maryam Jalessi, Guive Sharifi, Mohammad Rasool Mirfallah Layalestani, Ebrahim Amintehran, Parin Yazdanifard, Omidvar Rezaee Mirghaed,Mohammad Farhadi. Sellar reconstruction algorithm in endoscopic trans sphenoidal pituitary surgery: experience with 240 cases. Medical Journal of the Islamic Republic of Iran, Vol. 27, No. 4, Nov 2013, pp. 186-194.

## Otolaryngology

22. Hajiioannou J, Koudounarakis E, Alexopoulos K, Kotsani A, Kyrmizakis DE. Maxillary sinusitis of dental origin due to oroantral fistula, treated by endoscopic sinus surgery and primary fistula closure. J Laryngol Otol. 2010 Sep;124(9):986-9."
23. Turk H, Duran H, Okur H. The use of Glubran® 2 in management of cleft palate. Duzce Tip Fakultesi Dergisi 2008; 3:29-31.
24. Tuzuner A, Demirci S, Kuran G, Callioglu EE, Tulaci KG, Caylan R. Does Glubran® 2 improve the graft uptake in tympanoplasty? A retrospective study. Eur Arch Otorhinolaryngol. 2015 Jan;272(1):3-8.
25. Khaled A Al-Abdulhadi, Alaa A. Abou-Bieh. Cyanoacrylate Glue in Tympanoplasty: A Case Presentation Otolaryngology - Head and Neck Surgery September 2009 141: P184.
26. Hesham. S. Khalil; Mohammad A. Elshall; Yazeed Al-Harbi; Saeed Al-Asmar; Mohammad Al-Wadee. Healing of Oral Surgical Wounds Using 3/0 Silk Suture and N-butyl Cyanoacrylate Tissue Adhesive. Egyptian Dental Journal Vol. 55, 2607:2613, October, 2009.
27. Nikola Buric, DMD, MSD, PhD* Use of N-Butyl Cyanoacrylate with Metacryloxisulfolane (Glubran® 2) Surgical Glue for Flapless Closure of Oroantral Communication Implant Dentistry; Volume 0, Number 0 2013.
28. Elbassiouny AM. Use of Glubran® 2 in uvulopalatoplasty, an alternative to sutures to improve surgical outcome. Operative Techniques in Otolaryngology-Head and Neck Surgery, Volume 24, Issue 3, September 2013, Pages 184-189.

## Pediatric surgery

29. Esposito C, Damiano R, Settimi A, De Marco M, Maglio P, Centonze A. Experience with the use of tissue adhesives

in pediatric endoscopic surgery. Surg Endosc. 2004 Feb;18(2):290-2.

30. Esposito C. L'utilisation d'une nouvelle colle chirurgicale en chirurgie laparoscopique: quels avantages? J Coeliochir. 1997 23: 66–68.
31. Gajewska K, Herinckx A, Holoye A, D'Haene N, Massez A, Cassart M, Van Rysselberge M, Donner C. Antenatal embolization of a large chorioangioma by percutaneous Glubran® 2 injection. Ultrasound Obstet Gynecol. 2010 Dec;36(6):773-5. doi: 10.1002/uog.8806. Epub 2010 Nov 12.
32. Hosseini SM, Bahador A, Foroutan HR, Sabet B, Geramizadeh B, Zarenezhad M. The application of a new cyanoacrylate glue in pediatric surgery for fistula closure.Iran J Med Sci. 2011 Mar;36(1):54-6.
33. Ozturk H, Karaaslan K, Kocoglu H. Use of Glubran® 2 surgical glue in circumcision. Results in a comfortable postoperative period. Adv. Clin. Exp. Med 2009, 18, 4, 381-384.
34. Angotti R, Cerchia E, Molinaro F, Bulotta AL, Ferrara F, Bindi E, Messina M. Circumcision with Glubran® 2 in children: experience of Italian Center. Gland Surg. 2016 Aug;5(4):391-7.
35. Hosseini SM, Rasekhi AR, Zarenezhad M, Hedjazi A. Cyanoacrylate glue dressing for hypospadias surgery. N Am J Med Sci. 2012 Jul;4(7):320-2..
36. Rossi G, Angelini A, Mavrogenis AF, Rimondi E, Ruggieri P. Successful treatment of aneurysmal bone cyst of the hip in a child by selective transcatheter arterial embolization. J Vasc Interv Radiol. 2010 Oct;21(10):1591-5.

## General Surgery

### Prostheses Fixation

37. Garcia-Vallejo L, Couto-Gonzalez I, Concheiro-Coello P, Brea-Garcia B, Taboada-Suarez A. Cyanoacrylate surgical glue for mesh fixation in laparoscopic total extraperitoneal hernia repair. Surg Laparosc Endosc Percutan Tech. 2014 Jun; 24(3):240-3.
38. Ahmed E. Lasheen, Adel M. Tolba, Hany Mohamed, Hatem Mohammed, Nadia A. Smaeil. Laparoscopic Inguinal Hernia Repair with Closure of Hernial Defect and Central Mesh Fixation Using Glubran® 2. Surgical Science, 2013, 4, 554-557.
39. Dąbrowiecki S, Pierściński S, Szczęsny W. The Glubran® 2 glue for mesh fixation in Lichtenstein's hernia repair: a double-blind randomized study. Wideochir Inne Tech Maloinwazyjne. 2012 Jun;7(2):96-104.
40. Eldabe Mikhail A, Palomo Luquero A, Reoyo Pascual JF, Seco Gil JL. Prosthetic material fixation in open inguinal hernioplasty: suture vs. synthetic glue. Cir Esp. 2012 Aug-Sep;90(7):446-52.
41. Brügger L, Bloesch M, Ipaktchi R, Kurmann A, Candinas D, Beldi G. Objective hypoesthesia and pain after transabdominal preperitoneal hernioplasty: a prospective, randomized study comparing tissue adhesive versus spiral tacks. Surg Endosc. 2012 Apr;26(4):1079-85.
42. Schug-Pass C, Jacob DA, Rittinghausen J, Lippert H, Köckerling F. Biomechanical properties of (semi-) synthetic glues for mesh fixation in endoscopic inguinal hernia repair. Hernia. 2013 Dec;17(6):773-7.
43. Paajanen H, Kössi J, Silvasti S, Hulmi T, Hakala T. Randomized clinical trial of tissue glue versus absorbable sutures for mesh fixation in local anaesthetic Lichtenstein hernia repair. Br J Surg. 2011 Sep;98(9):1245-51.
44. Dilege E, Deveci U, Erbil Y, Dinççağ A, Seven R, Ozarmagan S, Mercan S, Barbaros U. N-butyl cyanoacrylate versus conventional suturing for fixation of meshes in an incisional hernia model. J Invest Surg. 2010 Oct;23(5):262-6.
45. Losi P, Burchielli S, Spiller D, Finotti V, Kull S, Briganti E, Soldani G. Cyanoacrylate surgical glue as an alternative to suture threads for mesh fixation in hernia repair. J Surg Res. 2010 Oct;163(2):e53-8.
46. Grasso G, Florio G, Mari A, Del Papa M, Carnì D. Trattamento dell'ernia inguinale con procedura IPPM (intraperitoneal polyvinylidene fluoride polypropylene mesh): tecnica personale. Osp. Ital Chir. Luglio Settembre 2010.
47. Testini M, Lissidini G, Poli E, Gurrado A, Lardo D, Piccinni G. A single-surgeon randomized trial comparing sutures, N-butyl-2-cyanoacrylate and human fibrin glue for mesh fixation during primary inguinal hernia repair. Can J Surg. 2010 Jun;53(3):155-60.
48. Kull S, Martinelli I, Briganti E, Losi P, Spiller D, Tonlorenzi S, Soldani G. Glubran® 2 surgical glue: in vitro evaluation of adhesive and mechanical properties. J Surg Res. 2009 Nov;157 (1):e15-21.
49. Ladurner R, Drosse I, Seitz S, Plitz W, Barbaryka G, Siebeck M, Bürklein D, Kirchhoff C, Buhman S, Mutschler W, Schieker M, Mussack T. Tissue attachment strength and adhesion formation of intraabdominal fixed meshes with cyanoacrylate glues. Eur J Med Res. 2008 May 26;13(5):185-91.
50. Agresta F, Baldazzi GA, Ciardo LF, Trentin G, Giuseppe S, Ferrante F, Bedin N. Lightweight partially absorbable monofilament mesh (polypropylene/poliglecaprone 25) for TAPP inguinal hernia repair: initial experience. Surg Laparosc Endosc Percutan Tech. 2007 Apr;17(2):91-4.
51. Paajanen H, Syvähuoko I, Airo I. Totally extraperitoneal endoscopic (TEP) treatment of sportsman's hernia. Surg Laparosc Endosc Percutan Tech. 2004 Aug;14(4):215-8.
52. J. F. Kukleta • C. Freytag • M. Weber. Efficiency and safety of mesh fixation in laparoscopic inguinal hernia repair using n-butyl cyanoacrylate: long-term biocompatibility in over 1,300 mesh fixations. Received: 18 August 2010 / Accepted: 1 October 2011.
53. Lukas Brugger • Martina Bloesch • Ramin Ipaktchi •Anita Kurmann • Daniel Candinas • Guido Beldi. Objective hypoesthesia and pain after transabdominal preperitoneal hernioplasty: a prospective, randomized study comparing tissue adhesive versus spiral tacks. Surg Endosc (2012) 26:1079–1085.
54. Ana M. Villarreal-Gómez, Manuel Martínez-Paíno, and José Miguel Martín-Martínez, New flexible cyanoacrylate tissue adhesive Adhflex® : Adhesion and performance in inguinal hernia repair. Vol. 638, pp 73-78 Revised: 2014-11-07 doi:10.4028/www.scientific.net/KEM.638.73 Accepted: 2014-11-13 2015 Trans Tech Publications, Switzerland.
55. Harsløf S, Krum-Møller P, Sommer T, Zinther N, Wara P, Friis-Andersen H. Effect of fixation devices on postoperative pain after laparoscopic ventral hernia repair: a randomized clinical trial of permanent tacks, absorbable tacks, and synthetic glue. Langenbecks Arch Surg. 2018 Jun;403(4):529-537.
56. Muysoms FE, Novik B, Kyle-Leinhase I, Berrevoet F. Mesh fixation alternatives in laparoscopic ventral hernia repair. Surg Technol Int. 2012 Dec;22:125-32. Review.
57. Kockerling F., • C. Schug-Pass What do we know about titanized polypropylene meshes? An evidence-based review of the literature. Hernia (2014) 18:445–457.
58. Harsløf S, Zinther N, Harsløf T, Danielsen C, Wara P, Friis-Andersen H. Mesh shrinkage depends on mesh properties and anchoring device: an experimental long-term study in sheep. Hernia. 2017 Feb;21(1):107-113.

59. Villalobos RN, Mias MC, Gas C, Maestre Y, Nogués M, Vilardell F, Olsina JJ. Atraumatic laparoscopic intraperitoneal mesh fixation using a new laparoscopic device: an animal experimental study. Hernia. 2019 Jul 19.
60. Garcıa-Vallejo L, Madrinan M, Baamonde I, Baltar J, Escudero B, Folgar L. Prophylactic Laparoscopic Hiatoplasty Technique with a Bioabsorbable Synthetic Tissue Regenerator in the Surgical Treatment of Gastroesophageal Reflux Disease. Videoscopy. 2013.
61. Zoccali C, Covello R, Di Francesco A, Zoccali G. A cyanoacrylate and silastic patch to reduce the risk of opening of the tumor: technical note. Eur J Surg Oncol. 2013 Jan;39(1):44-5.
62. Bertleff MJ, Liem RS, Bartels HL, Robinson PH, Van der Werff JF, Bonjer HJ, Lange JF. The "stamp method": a new treatment for perforated peptic ulcer Surg Endosc. 2006 May;20(5):791-3.
63. Kakaei F, Seyyed Sadeghi MS, Sanei B, Hashemzadeh S, Habibzadeh A. A randomized clinical trial comparing the effect of different hemostatic agents for hemostasis of the liver after hepatic resection. HPB Surg. 2013;2013:587608.
64. Delrio P, Scala D, Niglio A, Ruffolo F, Sassaroli C, Pace U, Rega D, Cardone E. Sigillare e rinforzare l'anastomosi intestinale. "Proceedings XXXVIII Congresso Sico 2015" CIC Edizioni Internazionali, pag. 8-10.
65. J, Lochman P, Blazej S, Pavlik M. Glued versus stapled anastomosis of the colon: an experimental study to determine comparative resistance to intraluminal pressure. Asian J Surg. 2014 Jul;37(3):154-61.
66. Paral J, Subrt Z, Lochman P, Klein L, Hadzi-Nikolov D, Turek Z, Vejbera M. Suture-free anastomosis of the colon. Experimental comparison of two cyanoacrylate adhesives. J Gastrointest Surg. 2011 Mar;15(3):451-9.
67. Mezza T, Clemente G, Sorice GP, Conte C, De Rose AM, Sun VA, Cefalo CMA, Pontecorvi A, Nuzzo G, Giaccari A. Metabolic consequences of the occlusion of the main pancreatic duct with acrylic glue after pancreaticoduodenectomy. Am J Surg. 2015 Oct;210(4):783-9.
68. Capaldi M., Alessandroni L., Barreca M., Campanelli A. , De Siena T., Ricci G., Sorgi G., Tersigni R. Trattamento del moncone pancreatico residuo con cianoacrilato dopo duodeno-cefalopancreasectomia. Osp Ital Chir CD-ROM 1-2006 (Gennaio-Marzo). Vol. 12 n. 1.
69. Nasti AG, Leggieri R, Lozito C, Iarussi T. Tumore pseudopapillare solido del corpo del pancreas in un'adolescente: case report e revisione della letteratura. Extract from "Proceedings XXXVIII Congresso Sico 2015" CIC Edizioni Internazionali, pag. 6-7.
70. Pisaniello D., Sealing in pancreatic surgery. Proceedings of XXVIII SPIGC National Congress. Varese, 22-24 March 2017.
71. Sergio A., Di Miceli D., Pericoli Ridolfini M., Rotondi F., Di Giorgio A., Doglietto GB. Occlusione del dotto pancreatico dopo duodeno-cefalopancreasectomia. Tecnica, diabete post-operatorio e trattamento delle fistole pancreatiche. Osp Ital Chir CD-ROM 1-2006.
72. Mezza T, Clemente G, Sorice GP, Conte C, De Rose AM, Sun VA, Cefalo CM, Pontecorvi A, Nuzzo G, Giaccari A. Metabolic consequences of the occlusion of the main pancreatic duct with acrylic glue after pancreaticoduodenectomy. Am J Surg. 2015 Oct;210(4):783-9.
73. Bifulco G, Giampaolino P, Morra I, Tommaselli GA, Tarsitano F, Chiacchio G,Nappi C, Di Carlo C. Synthetic cyanoacrylic glue in the prevention of post-operative lymphocele after pelvic lymphadenectomy in patients with uterine malignancies: A prospective, single-blind, preliminary study. Gynecol Oncol. 2014 Sep;134(3):556-60.
74. Foroni F. Glubran® 2 to reduce lymphorrhoea in breast surgery. Proceedings of XXVIII SPIGC National Congress | Varese, 22-24 March 2017.
75. Meinero P, Mori L. Video-assisted anal fistula treatment (VAAFT): a novel sphincter-saving procedure for treating complex anal fistulas. Tech Coloproctol. 2011 Dec;15(4):417-22.
76. Queralto M, Portier G, Bonnaud G, Chotard JP, Cabarrot P, Lazorthes F. Efficacy of synthetic glue treatment of high crypoglandular fistula-in-ano. Gastroenterol Clin Biol. 2010 Sep;34(8-9):477-82.
77. Yurtçu M, Arbag H, Cağlayan O, Abasiyanik A, Oz M. The effect of cyanoacrylate in esophagocutaneous leakages occurring after esophageal anastomosis. Int J Pediatr Otorhinolaryngol. 2009 Jul;73(7):1053-5.
78. Barillari P, Basso L, Larcinese A, Gozzo P, Indinnimeo M. Cyanoacrylate glue in the treatment of ano-rectal fistulas. Int J Colorectal Dis. 2006. Dec;21(8):791-4.
79. Hanus T. Rectourethral fistulas. Int Braz J Urol. 2002 Jul-Aug;28(4):338-45.
80. Mutignani M, Tringali A, Khodadadian E, Petruzziello L, Spada C, Spera G, Familiari P, Costamagna G. External pancreatic fistulas resistant to conventional endoscopic therapy: endoscopic closure with N-butyl-2-cyanoacrylate (Glubran® 2). Endoscopy. 2004 Aug;36(8):738-42.
81. Amore A, Izzo F. Non soltanto un sigillante emostatico: evidenze cliniche delle proprietà biliostatiche del Glubran® 2. Proceedings XXXVIII Congresso SICO 2015; CIC Edizioni Internazionali, pag. 3-5.
82. Albino V , Palaia R , di Giacomo R , Amore A , Saponara R , Piccirillo M, Leongito M, Lastoria S, Granata V, Izzo F. Prevention of bilomas with cyanoacrylate-based surgical glue, after major liver resection. SICO 2014 - Padova - Poster Section.
83. Demirel M, Dereboy F, Ozturk A, Turhan E, Yazar T. Morel-Lavallee lesion. Results of surgical drainage with the use of synthetic glue. Saudi Med J. 2007 Jan;28(1):65-7.
84. Vasileiadou K, Kosmidis C, Anthimidis G, Miliaras S, Kostopoulos I, Fahantidis E. Cyanoacrylate Adhesive Reduces Seroma Production After Modified Radical Mastectomy or Quadrantectomy With Lymph Node Dissection-A Prospective Randomized Clinical Trial. Clin Breast Cancer. 2017 Dec;17(8):595-600.


### Thoracic surgery


85. Lozito C. Coating e rinforzo delle suture in chirurgia toracica oncologica. Le propreietà aereostatiche del Glubran® 2. Proceedings XXXVIII Congresso SICO 2015 CIC Edizioni Internazionali, pag. 6-7.
86. Alar T, Ceylan KC, Duman E, Usluer O, Başok O. Is Acrylate Co-monomer (Glubran® 2) Useful in the Prevention of Prolonged Air Leaks After Pulmonary Lobectomy? Indian J Surg. 2013 Oct;75(5):373-6.
87. Pedicini V, Santonocito OG, Poretti D, Tramarin M, Lanza E. Iatrogenic. Pulmonary Pseudoaneurysm Treated with Percutaneous Coil and Glue Embolization. J Vasc Interv Radiol. 2017 Oct;28(10):1444-1445.
88. García-Polo C, León-Jiménez A, López-Campos JL, Arnedillo A, González-Moya E, Fernández-Berni JJ, Gómez JM. Endoscopic sealing of bronchopleural fistulas with submucosal injection of a tissue expander: a novel technique. Can Respir J. 2010 Jan-Feb;17(1):e23-4.
89. Lucernoni P, Durigato A, Pizzetto M, Oliboni G, Ravanello M,

Santelli G, Di Falco G. Un complicato caso di sarcoidosi. Rassegna di patologia dell'apparato respiratorio 2003; 18: 62-65.

90. Gimferrer JM, Serra M, Iglesias M, Rubio M, Belda J. Video-assisted direct closure of bronchial fistula. J Laparoendosc Adv Surg Tech A. 2003 Apr;13(2):121-2.
91. Davoli F, Sellitri F, Brandolini J, Dolci G, Castagnoli A, Bedetti B, Stella F. Use of coagulant spray glue (Glubran® 2) for aerostatic purposes in pulmonary parenchyma resections in pigs: a preliminary study. Eur Surg Res. 2009;43(4):360-4.
92. Saikia MK, Kalita JP, Handique A, Topno N, Sarma K. Bronchoesophageal Fistula Repair with Intercostal Muscle Flap Followed by Occlusion of Residual Diverticula with N-butyl Cyanoacrylate (NBCA) Glue: A Case Report. J Clin Diagn Res. 2016 Aug;10(8):PD03-4.

### Gynecological surgery

93. Panel P, Soffray F, Roussillon E, Devins C, Brouziyne M, Abramowicz S. Glue mesh fixation: Feasibility, tolerance and complication assessment. Results 24months after laparoscopic sacrocolpopexy. J Gynecol Obstet Hum Reprod. 2017 Apr;46(4):333-338.
94. Bifulco G, Giampaolino P, Morra I, Tommaselli GA, Tarsitano F, Chiacchio G,Nappi C, Di Carlo C. Synthetic cyanoacrylic glue in the prevention of post-operative lymphocele after pelvic lymphadenectomy in patients with uterine malignancies: A prospective, single-blind, preliminary study. Gynecol Oncol. 2014 Sep;134(3):556-60.

### Urological surgery

95. Tammaro V, Vernillo A, Dumani X, Florio I, Pelosio L, Jamshidi A, Romagnuolo R, Calogero A, Carlomagno N, Santangeloa M, Renda A. Prevention of fluid effusion in kidney transplantation with the use of hemostatic biomaterials. Transplant Proc. 2014 Sep;46(7):2203-6.
96. Tenza-Tenza JA, Gil-Guijarro J, Pinzón-Navarrete I, Mira-Moreno A, Pelluch-Auladell AM, Lobato-Encinas JJ. Cyanoacrylate glues for sealing renal biopsies in bench surgery in kidney transplantation. Dial Traspl. 2013; 34(1):19-22.
97. Carmignani L, Acquati P, Rocco F. Case report: Cystoscopic use of cyanoacrylate glue for bleeding during transurethral resection of bladder tumors. J Endourol. 2006 Nov;20(11):923-4.
98. Selli C, De Maria M, Manica M, Turri FM, Manassero F. Minimally invasive treatment of urinary fistulas using N-butyl-2-cyanoacrylate: a valid first line option. BMC Urol. 2013 Oct 24;13:55.
99. Hosseini SM, Bahador A, Foroutan HR, Sabet B, Geramizadeh B, Zarenezhad M. The application of a new cyanoacrylate glue in pediatric surgery for fistula closure. Iran J Med Sci. 2011 Mar;36(1):54-6.
100. Muto G, D'Urso L, Castelli E, Formiconi A, Bardari F. Cyanoacrylic glue: a minimally invasive nonsurgical first line approach for the treatment of some urinary fistulas. J Urol. 2005 Dec;174(6):2239-43.
101. Bardari F, D'Urso L, Muto G. Conservative treatment of iatrogenic urinary fistulas: the value of cyanoacrylic glue. Urology. 2001 Dec;58(6):1046-8.
102. Tanda G.. Ruolo del N-butil-cianacrilato nel trattamento di primo livello delle fistole urinose. Tesi di Laurea Università di Pisa A.A. 2013-2014. Relatore Selli C.. https://etd.adm.unipi.it/t/etd-02112015-121741.
103. Ozturk1 H., Karaaslan K., Kocoglu H. Use of Glubran® 2 surgical glue in circumcision. Results in a comfortable postoperative period. Adv. Clin. Exp. Med 2009, 18, 4, 381-384
104. Akgül T, Ayyildiz A, Cebeci O, Nuhoğlu B, Ozer E, Germiyanoğlu C, Ustün H. Effect of cyanoacrylic glue on penile fracture: an experimental study. J Urol.2008 Aug;180(2):749-52.
105. Barbagli G, Pellegrini G, Corradini F, Montorsi F, Sansalone S, Butnaru D, Lazzeri M. One-stage Penile Urethroplasty Using Oral Mucosal Graft and Glue. Eur Urol. 2016 Dec;70(6):1069-1075.

### Bariatric surgery

106. Martines G, Digennaro R, De Fazio M, Capuano P. Cyanoacrylate sealant compared to fibrin glue in staple line reinforcement during laparoscopic sleeve gastrectomy. Pilot prospective observational study. G Chir. 2017 Jan-Feb;38(1):50-52.
107. Chetta N, Picciariello A, Nagliati C, Balani A, Martines G. Surgical treatment of gastric GIST with acute bleeding using laparoscopic sleeve gastrectomy: A report of two cases. Clin Case Rep. 2019 Mar 12;7(4):776-781.
108. Capuano A, Martines G. Glubran® 2 in chirurgia bariatrica: un'esperienza monocentrica. From "Proceedings XXXVIII Congresso SICO 2015 CIC Edizioni Internazionali, pag. 15-16.
109. Mavrogenis G, Coumaros D, Tzilves D, Rapti E, Stefanidis G, Leroy J, Becmeur F. Cyanoacrylate glue in the management of blue rubber bleb nevus syndrome. Endoscopy. 2011;43 Suppl 2 UCTN:E291-2.

### Endoscopy

110. López J, Rodriguez K, Targarona EM, Guzman H, Corral I, Gameros R, Reyes A.Systematic review of cyanoacrylate embolization for refractory gastrointestinal fistulae: a promising therapy. Surg Innov. 2015 Feb;22(1):88-96.
111. Katsanos KH, Christodoulou DK, Kamina S, Maria K, Lambri E, Theodorou S, Tsampoulas K, Vasiliki M, Tsianos EV. Diagnosis and endoscopic treatment of esophago-bronchial fistula due to gastric heterotopy. World J Gastrointest Endosc. 2010 Apr 16;2(4):138-42.
112. Romano A, Spaggiari M, Masetti M, Sassatelli R, Di Benedetto F, De Ruvo N, Montalti R, Guerrini GP, Ballarin R, De Blasiis MG, Gerunda GE. A new endoscopic treatment for pancreatic fistula after distal pancreatectomy: case report and review of the literature. Gastrointest Endosc. 2008 Oct;68(4):798-801.
113. Rotondano G, Viola M, Orsini L, Cipolletta F, Bianco MA, Garofano ML, Cipolletta L. Uncommon cause of early postoperative colonic fistula successfully treated with endoscopic acrylate glue injection. Gastrointest Endosc. 2008 Jan;67(1):183-6.
114. Mutignani M, Tringali A, Khodadadian E, Petruzziello L, Spada C, Spera G, Familiari P, Costamagna G. External pancreatic fistulas resistant to conventional endoscopic therapy: endoscopic closure with N-butyl-2-cyanoacrylate (Glubran® 2). Endoscopy. 2004 Aug;36(8):738-42.
115. Musa N, Aquilino F, Panzera P, Martines G. Successful conservative treatment of enterocutaneous fistula with cyanoacrylate surgical sealant: case report. G Chir. 2017 Sep-Oct;38(5):256-259.
116. Grassia R, Staiano T, Iiritano E, Bianchi G, Dizioli P, Coppeta GP, Buffoli F. Use of cyanoacrylate glue as a rescue therapy of a duodenal diverticular rebleeding. Gastrointest Endosc. 2012 Jun;75(6):1288-9.

117. Grassia R, Staiano T, Iiritano E, Bianchi G, Savarese MF, Buffoli F. Cyanoacrylate injection for treatment of non-variceal upper gastrointestinal bleeding after failure of conventional endoscopic hemostasis. Abstracts of the 19th National Congress of Digestive Diseases / Digestive and Liver Disease 45S (2013) S55–S218.
118. Loffroy R, Guiu B, D'Athis P, Mezzetta L, Gagnaire A, Jouve JL, Ortega-Deballon P, Cheynel N, Cercueil JP, Krausé D. Arterial embolotherapy for endoscopically unmanageable acute gastroduodenal hemorrhage: predictors of early rebleeding. Clin Gastroenterol Hepatol. 2009 May;7(5):515-23.
119. Repici A, Ferrari A, De Angelis C, Caronna S, Barletti C, Paganin S, Musso A, Carucci P, Debernardi-Venon W, Rizzetto M, Saracco G. Adrenaline plus cyanoacrylate injection for treatment of bleeding peptic ulcers after failure of conventional endoscopic hemostasis. Dig Liver Dis. 2002 May;34(5):349-55.
120. Ortiz de Zarate J, Calderón AJ, Ruiz P, Díaz AB, Cabezudo P, Polo F, Marcé L, Blanco S, Orive V. Use of glue and metal clips for endoscopic sealing of iatrogenic gastric perforation. Gastroenterol Hepatol. 2006 Feb;29(2):109-10.
121. Loffroy R.. Embolization for Upper GI Bleeding. Endovascular today. April 2016.vol. 15, no. 4.
122. Grassia R, Capone P, Iiritano E, Vjero K, Cereatti F, Martinotti M, Rozzi G, Buffoli F. Non-variceal upper gastrointestinal bleeding: Rescue treatment with a modified cyanoacrylate. World J Gastroenterol. 2016 Dec 28;22(48):10609-10616.
123. Weil D, Cervoni JP, Fares N, Rudler M, Bureau C, Plessier A, Dao T, Pauwels A, Thabut D, Castellani P, Oberti F, Carbonell N, Elkrief L, Di Martino V, Thevenot T; Club Francophone pour l'Etude de l'Hypertension Portale (CFEHTP). Management of gastric varices: a French national survey. Eur J Gastroenterol Hepatol. 201 6 of gastric varices: a French national survey. Eur J Gastroenterol Hepatol. 2016
124. Bège T, Emungania O, Vitton V, Ah-Soune P, Nocca D, Noël P, Bradjanian S,Berdah SV, Brunet C, Grimaud JC, Barthet M. An endoscopic strategy for management of anastomotic complications from bariatric surgery: a prospective study. Gastrointest Endosc. 2011 Feb;73(2):238-44.
125. Marcello R, Marcello G. Glubran® 2 Transcatheter Embolization of Active Gastrointestinal Hemorrhage. International symposium on endovascular therapy 2014, Jan 18-22.
126. Rivet C, Robles-Medranda C, Dumortier J, Le Gall C, Ponchon T, Lachaux A. Endoscopic treatment of gastroesophageal varices in young infants with cyanoacrylate glue: a pilot study. Gastrointest Endosc. 2009 May;69(6):1034-8.
127. Cipolletta L, Zambelli A, Bianco MA, De Grazia F, Meucci C, Lupinacci G,Salerno R, Piscopo R, Marmo R, Orsini L, Rotondano G. Acrylate glue injection for acutely bleeding oesophageal varices: A prospective cohort study. Dig Liver Dis. 2009 Oct;41(10):729-34.
128. Sáenz de Miera Rodríguez A, Baltar Arias R, Vázquez Rodríguez S, Díaz Saa W, Ulla Rocha JL, Vázquez-Sanluis J, Vázquez Astray E. N-Butyl-2-cyanoacrylate plug on fundal varix: persistence 3 years after sclerosis. Rev Esp Enferm Dig. 2009 Mar;101(3):212-4. English, Spanish.
129. Seewald S, Sriram PV, Naga M, Fennerty MB, Boyer J, Oberti F, Soehendra N. Cyanoacrylate glue in gastric variceal bleeding. Endoscopy. 2002 Nov;34(11):926-32.
130. Seewald S, Seitz U, Yang AM, Soehendra N. Variceal bleeding and portal hypertension: still a therapeutic challenge? Endoscopy. 2001 Feb;33(2):126-39.
131. Battaglia G, Bocus P, Merigliano S, Morbin T, Carta A, Coppa F, Rampado S, Ancona E. Les aspects endoscopiques de l'hypertension portale: diagnostic et classification. Acta Endoscopica. 2000 Dec;30(5):537-554.
132. Seewald S, Ponnudurai R, Jackle S, Thonke F, Soehendra N. Traitment endoscopique de l'hemorragie par rupture de varices. Acta Endoscopica. 2000 Dec; 30(5):511-517.
133. Battaglia G, Morbin T, Patarnello E, Carta A, Coppa F, Ancona A. Diagnostic et traitement endoscopique des varices gastriques. Acta Endoscopica. 1999 Apr; 29(2):97-114.
134. Lee HH, Park JM, Chun HJ, Oh JS, Ahn HJ, Choi MG. Transcatheter arterial embolization for endoscopically unmanageable non-variceal upper gastrointestinal bleeding. Scand J Gastroenterol. 2015 Jul;50(7):809-15.
135. Franco MC, Gomes GF, Nakao FS, de Paulo GA, Ferrari AP Jr, Libera ED Jr. Efficacy and safety of endoscopic prophylactic treatment with undiluted cyanoacrylate for gastric varices. World J Gastrointest Endosc. 2014 Jun 16;6(6):254-9.
136. Weil D, Cervoni JP, Fares N, Rudler M, Bureau C, Plessier A, Dao T, Pauwels A, Thabut D, Castellani P, Oberti F, Carbonell N, Elkrief L, Di Martino V, Thevenot T; Club Francophone pour l'Etude de l'Hypertension Portale (CFEHTP). Management of gastric varices: a French national survey. Eur J Gastroenterol Hepatol. 2016 May;28(5):576-81.
137. Favard N., Moulin M., Fauque P., Bertaut A., Favelier S., Estivalet L., Michel F., Cormier L., Sagot P., Loffroy R.Comparison of three different embolic materials for varicocele embolization: retrospective study of tolerance,radiation and recurrence rate. Quant Imaging Med Surg. 2015 Dec;5(6):806-14.
138. Bèretti D. Trattamento delle fistole enteriche post-chirurgiche con iniezione imaging-guidata di colla a base di cianoacrilato modificato. Extract from "Proceedings XXXVIII Congresso Sico 2015" CIC Edizioni Internazionali, pag.11-14.
139. Loffroy R. Using Glubran® 2 acrylic glue to maximize results of transcatheter arterial embolization for refractory upper gastrointestinal bleeding. Scand J Gastroenterol. 2015;50(10):1306-7.
140. San Norberto EM, Brizuela JA, Revilla Á, Taylor JH, Vaquero C. Endovascular embolization of a muscular symptomatic arteriovenous malformation with Glubran® 2 acrylic glue. Vascular. 2015 Aug;23(4):432-5.
141. Rebonato A, Auci A, Sanguinetti F, Maiettini D, Rossi M, Brunese L, Carrafiello G, Torri T. Embolization of the periprostatic venous plexus for erectile dysfunction resulting from venous leakage. J Vasc Interv Radiol. 2014 Jun;25(6):866-72.
142. Urbano J, Cabrera M, Alonso-Burgos A. Sclerosis and varicocele embolization with N-butyl cyanoacrylate: experience in 41 patients. Acta Radiol. 2014 Mar;55(2):179-85.
143. Del Corso A, Vergaro G. Percutaneous treatment of iatrogenic pseudoaneurysms by cyanoacrylate-based wall-gluing. Cardiovasc Intervent Radiol. 2013Jun;36(3):669-75.
144. Rossi G, Mavrogenis AF, Casadei R, Bianchi G, Romagnoli C, Rimondi E, RuggieriP. Embolisation of bone metastases from renal cancer. Radiol Med. 2013 Mar;118(2):291-302.
145. Mauri G, Sconfienza LM, Fiore B, Brambilla G, Pedicini V, Poretti D, Lutman RF, Montorsi M, Sardanelli F. Post-surgical enteric fistula treatment with image-guided percutaneous injection of cyanoacrylic glue. Clin Radiol. 2013 Jan;68(1):59-63.
146. Rossi G, Mavrogenis AF, Rimondi E, Ciccarese F, Tranfaglia C, Angelelli B,Fiorentini G, Bartalena T, Errani C, Ruggieri P, Mercuri M. Selective arterial embolisation for bone tumours: experience of 454 cases. Radiol Med. 2011 Aug;116(5):793-808.
147. Chandra J, Anthony S, Uberoi R. Embolization of the internal iliac artery with Glubran® 2 acrylic glue: initial experience with

an adjunctive outflow occlusive agent. J Vasc Interv Radiol. 2010 Jul;21(7):1109-14.

148. Rossi G, Rimondi E, Bartalena T, Gerardi A, Alberghini M, Staals EL, Errani C,Bianchi G, Toscano A, Mercuri M, Vanel D. Selective arterial embolization of 36 aneurysmal bone cysts of the skeleton with N-2-butyl cyanoacrylate. Skeletal Radiol. 2010 Feb;39(2):161-7.
149. Loffroy R, Guiu B. Role of transcatheter arterial embolization for massive bleeding from gastroduodenal ulcers. World J Gastroenterol. 2009 Dec 21;15(47):5889-97.
150. Pedicini V. Treatment of postoperative enteric fistulas through percutaneous image-guided injection of Glubran® 2 2. XXVIII SPIGC National Congress | Varese, 22-24 March 2017.
151. Urbano J, Cabrera M, Alonso A. Usage and applicability of Cyanoacrilate monomer: further vascular malformations. e-Poster: P-157 Congress: CIRSE 2009.
152. Lauterio A, Slim A, Aseni P, Giacomoni A, Di Sandro S, Corso R, Mangoni I, Mihaylov P, Al Kofahi M, Pirotta V, De Carlis L. Percutaneous Transhepatic Bile Duct Ablation with n-Butyl Cyanoacrylate in the Treatment of a Biliary Complication after Split Liver Transplantation. J Transplant. 2009;2009:824803. doi: 10.1155/2009/824803. Epub 2009 Jun 24.
153. Gandini R, Angelopoulos G, Konda D, Messina M, Chiocchi M, Perretta T, Simonetti G. Transcatheter embolization of a large symptomatic pelvic arteriovenous malformation with Glubran® 2 acrylic glue. Cardiovasc Intervent Radiol. 2008 Sep-Oct;31(5):1030-3.
154. Gorlitzer M, Mertikian G, Trnka H, Froeschl A, Meinhart J, Weiss G, Grabenwoeger M, Rand T. Translumbar treatment of type II endoleaks after endovascular repair of abdominal aortic aneurysm. Interact Cardiovasc Thorac Surg. 2008 Oct;7(5):781-4.
155. Keeling AN, Costello R, Lee MJ. Rasmussen's aneurysm: a forgotten entity? Cardiovasc Intervent Radiol. 2008 Jan-Feb;31(1):196-200.
156. Heye S, Maleux G, Wilms G. Pain experience during internal spermatic vein embolization for varicocele: comparison of two cyanoacrylate glues. Eur Radiol. 2006 Jan;16(1):132-6.
157. Gandini R, Spinelli A, Konda D, Reale CA, Fabiano S, Pipitone V, Simonetti G. Superselective embolization in posttraumatic priapism with Glubran® 2 acrylic glue. Cardiovasc Intervent Radiol. 2004 Sep-Oct;27(5):544-8.
158. Schoder M, Cartes-Zumelzu F, Grabenwöger M, Cejna M, Funovics M, Krenn CG, Hutschala D, Wolf F, Thurnher S, Kretschmer G, Lammer J. Elective endovascular stent-graft repair of atherosclerotic thoracic aortic aneurysms: clinical results and midterm follow-up. AJR Am J Roentgenol. 2003 Mar;180(3):709-15.
159. Mauri G, Pescatori LC, Mattiuz C, Poretti D, Pedicini V, Melchiorre F, Rossi U, Solbiati L, Sconfienza LM. Non-healing post-surgical fistulae: treatment with image-guided percutaneous injection of cyanoacrylic glue. Radiol Med. 2017 Feb;122(2):88-94.
160. Andronic O., Alexa O., Veliceasa B. Outocome of internal Hemipelvectomy in a patient with multiple myeloma -case report Rev. Med.Chir2016 vol 120.
161. Abdulmalak G, Chevallier O, Falvo N, Di Marco L, Bertaut A, Moulin B, Abi-Khalil C, Gehin S, Charles PE, Latournerie M, Midulla M, Loffroy R. Safety and efficacy of transcatheter embolization with Glubran® 2 cyanoacrylate glue for acute arterial bleeding: a single-center experience with 104 patients. Abdom Radiol (NY). 2018 Mar;43(3):723-733.
162. Gandini R., Chiocchi M., Morsetti D., Chiaravallotti A., Loreni G., Simonetti G.. Transcaval eandoleak embolization (TCEE) of type I and II endoleaks occuring after endovascular abdominal aortie aneurysm repair (EVAR) CIRSE 2013.
163. Saiz-Mendiguren R, Samuel-Espin RS, Llopis-Pardo M. Transiliac biposy of a deep pelvic mass with ulterior embolization of the biopsy path Saiz-Mendiguren. Intervencionismo. 2016;16(4):30-3.
164. Berthod PE, Chevallier O, Latournerie M, Gehin S, Falvo N, Midulla M, Loffroy R. Atypical use of ALN inferior vena cava filters as protection devices prior to embolization of a large portosystemic shunt with Amplatzer Vascular Plugs and Glubran® 2 cyanoacrylate glue. Quant Imaging Med Surg. 2018 May;8(4):452-456.
165. Sungmin Woo, Chang Jin Yoon, Jin Wook Chung, Sung-Gwon Kang, Hwan Jun Jae, Hyo-Cheol Kim, Nak Jong Seong, Young-Joo Kim, Young-Nam Woo, Control Hemoptysis: Comparison of N-Butyl-2-Cyanoacrylate and Polyvinyl Alcohol Particles Radiology: Volume 269: Number 2—November 2013
166. Del Corso A, Bargellini I, Cicorelli A, Perrone O, Leo M, Lunardi A, Alberti A, Tomei F, Cioni R, Ferrari M, Bartolozzi C. Efficacy and safety of a novel vascular closure device (Glubran® 2 seal) after diagnostic and interventional angiography in patients with peripheral arterial occlusive disease. Cardiovasc Intervent Radiol. 2013 Apr;36(2):371-6.167.
167. Emiel B, J. Sturm, and Luc Defreyne, Acute Non variceal Gastrointestinal Hemorrhage April 2010 I Endovascular Today.
168. Loffroy R, Kretz B, Guiu B, Bouchot O, Cercueil JP, Brenot R, Krausé D., Steinmetz E. Embolisation percutanée transabdominale d'une endofuite de type 2B sur stent-graft aortique abdominal J Radiol 2010;91:901-4.
169. Cotroneo E, Gigli R, Casasco A. Fistole artero-venose midollari giganti con drenaggio venoso perimidollare. Trattamento endovascolare. Rivista di Neuroradiologia 16 (Suppl. 1): 150-152 2003.
170. Niimi Y., Berenstein A., Setton A. Complications and their management during NBCA embolization of craniospinal Lesions. Interventional Neuroradiology 9 (Supp11): 157-164,2003.
171. Roberto De Blasi. Glubran® 2 nel trattamento di MAV cerebrali non-emorragiche ed emorragiche. Edizione GEM 2016.
172. Leonardi M, Cenni P, Simonetti L, Bozzao A, Romano A, Bonamini M, Fantozzi LM, Fini G. Glubran® 2((r)):a new acrylic glue for neuroradiological endovascular use: a complementary histological study. Interv Neuroradiol. 2003 Sep 30;9(3):249-54. Epub 2004 Oct 22.
173. Perini S., Castellan L., Causin F. Malformazioni artero-venose cerebrali: neuroradiologia terapeutica Neurol. Sci. (2002) 23: S273-S275
174. Cotroneo E., Gigli R., Casasco A.. L'embolizzazione per via arteriosa e venosa delle fistole artero-venose intracraniche Rivista di Neuroradiologia 2003; 16 (suppl. 1): 39-42.
175. Raffi L, Simonetti L, Cenni P, Bandiera S, Gasbarrini A, Boriani S, Leonardi M. Presurgical embolization of spinal tumours using Glubran® 2 acrylic glue. Interv Neuroradiol. 2003 Dec 20;9(4):339-49. Epub 2004 Oct 22.
176. Abud DG, Mounayer C, Benndorf G, Piotin M, Spelle L, Moret J. Intratumoral injection of cyanoacrylate glue in head and neck paragangliomas. AJNR Am J Neuroradiol. 2004 Oct;25(9):1457-62. L.
177. Simonetti L., Raffi, P., Cenni A., Andreoli F., Calducci M., Leopardi M.. Presurgical embolization of intracranial extra-axial tumors using Glubran® 2: our experience in 14 patients. Rivista di Neuroradiologia 2004; 17: 645-658.

178. Barbara C., Pozzati E., Marcucci G., Joechler M., Pisoni L., Bellei E., Leopardi M., Masetti L. Effects of Glubran® 2 acrylic glue on the subaracnoid surface in swine preliminary findings. Rivista di Neuroradiologia 2005; 18: 537-545.
179. Desal HA, Toulgoat F, Raoul S, Guillon B, Al Hammad Ibrahim R, Auffray-Calvier E, De Kersaint-Gilly A. Brain arteriovenous malformations technical note of endovascular treatment with Glubran®. Interv Neuroradiol. 2005 Oct 5;11(Suppl 1):125-30.
180. Raffi L., Simonetti L., Cenni P., Leonardi M. Use of Glubran® 2 acrylic glue in interventional neuroradiology. Neuroradiology (2007) 49:829-836. Chapot R, Saint-Maurice JP, Narata AP, Rogopoulos A, Moreau JJ, Houdart E, Maubon A. Transcranial puncture through the parietal and mastoid foramina for the treatment of dural fistulas. Report of four cases. J Neurosurg. 2007 May;106(5):912-5.
181. J.Klisch, C. Eger, V. Sychra, C. Strasilla, S.Basche, J.Weber. Stent-Assisted Coil Embolization of Posterior Circulation Aneurysms Using Solitaire Ab: Preliminary Experience Neurosurgery: August 2009 - Volume 65 - Issue 2 - p 258-266.
182. Wang Y, Zhang H, Ling F. Coexistence of a single cerebral arteriovenous malformation and spinal arteriovenous malformation. Neurol India. 2009 Nov-Dec;57(6):785-8.
183. Rossitti S. Spontaneous Intracerebral and Intraventricular Hemorrhage. Clin Neuroradiol (2010); 20: 131-134.
184. Guedin P., Gaillard S., Boulin A., Condette-Auliac S., Bourdain F., Guieu S., Dupuy M., Rodesch G. Therapeutic management of intracranial dural arteriovenous shunts with leptomeningeal venous drainage: report of 53 consecutive patients with emphasis on transarterial embolization with acrylic glue. J Neurosurg. 2010, 112, 603-610.
185. Abdel Kerim A, Bonneville F, Jean B, Cornu P, LeJean L, Chiras J. Balloon-assisted embolization of skull base meningioma with liquid embolic agent. J Neurosurg. 2010 Jan;112(1):70-2.
186. Zheng-Ran Li, Zai-Bo Jiang, Ming-Sheng Huang, Kang-Shun Zhu, Qing Wang, Hong Shan. Transvenous embolization of cavernous sinus dural arteriovenous fistulas using detachable coils and Glubran® 2 acrylic glue via the inferior petrosal sinus approach. Eur Radiol (2010) 20: 2939–2947.
187. Q. Luo, H. Wang, K. Xu, J. Yu. Endovascular Treatments for Distal Posterior Cerebral Artery Aneurysms. Turkish Neurosurgery 2012, Vol: 22, 141-147.
188. Liu J, Lv M, Lv X, He H, Liu A, Qian Z, Li Y. Curative Glubran® 2 embolization of cerebral arteriovenous malformations patient selection and initial results. Interv Neuroradiol. 2014 Dec;20(6):722-8.
189. Li YJ, Barthès-Biesel D, Salsac AV. Polymerization kinetics of n-butyl cyanoacrylate glues used for vascular embolization. J Mech Behav Biomed Mater. 2017 May;69:307-317.
190. Pictures kindly provided by Poretti D., Pedicini V,. Lanza E. Interventional Radiology Center of the Clincal Institute Humanitas- Rozzano (MI) – Italy.

## Other Indications

191. Haghpanah S, Vafafar A, Golzadeh MH, Ardeshiri R, Karimi M. Use of Glubran® 2 and Glubran tissue skin adhesive in patients with hereditary bleeding disorders undergoing circumcision and dental extraction. Ann Hematol. 2011 Apr;90(4):463-8. PubMed PMID: 20878157.
192. García Cerdá D, Ballester AM, Aliena-Valero A, Carabén-Redaño A, Lloris JM. Use of cyanoacrylate adhesives in general surgery. Surg Today. 2015 Aug;45(8):939-56. doi: 10.1007/s00595-014-1056-4. Epub 2014 Oct 25. Review.
193. Balleri P, Veltri M, Nuti N, Ferrari M. Implant placement in combination with sinus membrane elevation without biomaterials: a 1-year study on 15 patients. Clin Implant Dent Relat Res. 2012 Oct;14(5):682-9.
194. Loffroy R, Guiu B, Cercueil JP, Krausé D. Endovascular therapeutic embolisation: an overview of occluding agents and their effects on embolised tissues. Curr Vasc Pharmacol. 2009 Apr;7(2):250-63. Review. PubMed PMID: 19356008.
195. Hesham. S. Khalil; Mohammad A. Elshall; Yazeed Al-Harbi, Saeed Al-Asmar, Mohammad Al-Wadee. Healing of Oral Surgical Wounds Using 3/0 Silk Suture and N-butyl Cyanoacrylate Tissue Adhesive. Egyptian Dental Journal Vol. 55, 2607:2613, October, 2009.
196. Storrer CL, Kummer Gdos S, Forcada SM, Zielak JC. Use of cyanoacrylate as barrier in guided tissue regeneration in class II furcation defects. J Indian Soc Periodontol. 2014;18(3):408411. doi:10.4103/0972-124X.134595.
197. Li YJ, Barthès-Biesel D, Salsac AV. Polymerization kinetics of n-butyl cyanoacrylate glues used for vascular embolization. J Mech Behav Biomed Mater. 2017;69:307317. doi:10.1016/j.jmbbm.2017.01.003.
198. Egenolf. F.. Sintesi e caratterizzazione di nuovi monomeri cianoacrilici per applicazioni in embolizzazione arteriosa. Tesi di Laurea Sperimentale Università di Bologna A.A. 2011-2012. Relatore Carretti.D. https://amslaurea.unibo.it/3848/#.
199. Cordischi, F. Sistemi adesivi con applicazioni in campo biomedicale, Università di Bologna. 2011 Relatore Carretti D. http://amsdottorato.unibo.it/3650/#.
200. Poli A, Parisi F, Millanta F, et al. Fixation of polyvinylidene fluoride (PVDF) mesh with cyanoacrylate-derived glues in a rat experimental model: histopathologic immunohistochemical and morphometric study. Hernia. 2019;10.1007/s10029-019-02078-5. doi:10.1007/s10029-019-02078-5.
201. Loffroy R, Falvo N, Nakaï M, et al. Partial splenic embolization with Glubran® 2/Lipiodol® mixture for oncological patients with hypersplenism-related thrombocytopenia requiring systemic chemotherapy. Quant Imaging Med Surg. 2019;9(3):409417. doi:10.21037/qims.2019.03.07.
202. Burza A, Avantifiori R, Curinga R, Santini E, Delle Site P, Stipa F. Minerva Chir. 2014;69(6):321329.
203. Boersema GSA, Vennix S, Wu Z, et al. Reinforcement of the colon anastomosis with cyanoacrylate glue: a porcine model. J Surg Res. 2017;217:8491. doi:10.1016/j.jss.2017.05.001.
204. Pilone V, Tramontano S, Renzulli M, et al. Omentopexy with Glubran® 2 for reducing complications after laparoscopic sleeve gastrectomy: results of a randomized controlled study. BMC Surg. 2019;19(Suppl 1):56. Published 2019 Nov 5. doi:10.1186/s12893-019-0507-7.
205. Pilone V, Tramontano S, Cutolo C, Vitiello A, Brongo S. Abdominoplasty after bariatric surgery: comparison of three different techniques. Minerva Chir. 2020;75(1):3742. doi:10.23736/S0026-4733.19.08045-3.
206. M. Foletto, L. Prevedello, G. Piatto, A. Albanese, D. Di Miceli. CYANOACRYLATE TO CLOSE MESENTERIC DEFECTS AFTER *LRYGB*. Gastric bypass procedures including Roux-en-Y gastric bypass (RYGB) and One Anastomosis gastric bypass (OAGB)/MGB. P.238. IFSO 2017 Abstract book.
207. Foresta E, Torroni A, Gasparini G, et al. Use of N-Butyl-2-Cyanoacrylate (Glubran® 2) in Fractures of Orbital-Maxillo-Zygomatic Complex. J Maxillofac Oral Surg. 2015;14(3):761764. doi:10.1007/s12663-015-0751-z.
208. Wipperman J, Konstas C, Breuer M, Kosmehl H, Wahlers T, Albes JM. Long-term effects in distal coronary anastomoses using different adhesives in a porcine off-pump model. The Jour. of Thor. and Cardiovasc. Surg. 2006 Aug; 132(2):325-331.
209. Pictures kindly provided by Lanza E., Poretti D., Pedicini V,. Interventional Radiology Center of the Clincal Institute Humanitas- Rozzano (MI) - Italy.

# CERTIFIED QUALITY.

**Thanks to the group efforts of a team of clinical and regulatory certification professionals**, GEM's quality system and production process has obtained the following certification

ISO 13485:2016 and ISO 9001:2015. GEM is also MDSAP certified as the devices produced are authorized for sale in Canada, Brazil and Australia.

EUROPEAN CERTIFICATIONS

**CE 0373**

**CE 1936**

michbold

# SOLUTION COMES FROM EVOLUTION.

GEM

Via dei Campi 2 - PO Box 427 - 55049 Viareggio (LU) Italy
Tel. +39 0584 389784/391388 - Fax +39 0584 397904
www.gemitaly.it - info@gemitaly.it

Rev. 00 - Ed. 06/07/2020