



# 食道括约肌磁珠环植入术

## 胃-食道反流病的治疗方法

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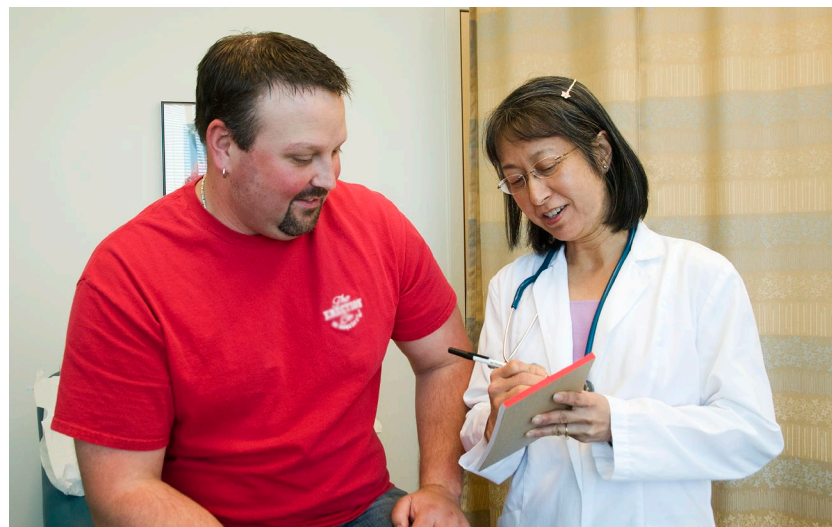
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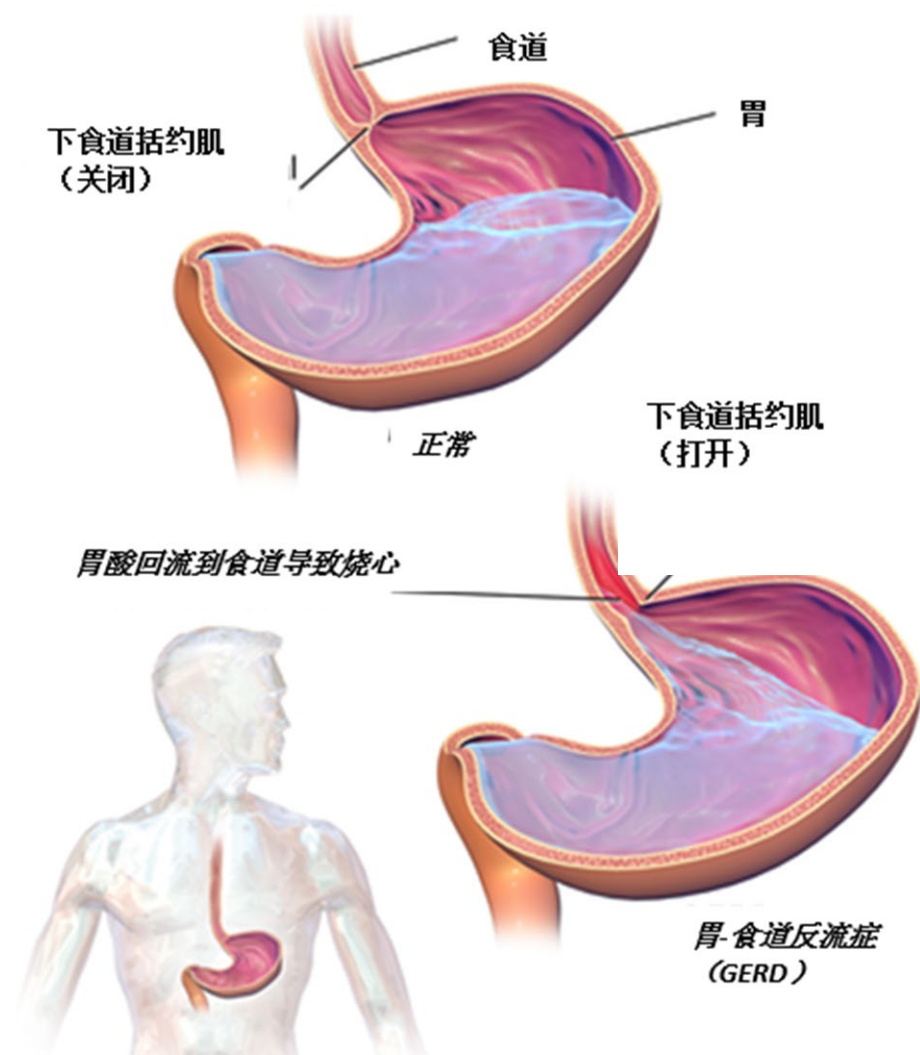
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与医生谈论您的疑问

### 什么是胃-食道反流症 (GERD) ?

胃-食管反流症（GERD）是一种影响食道的疾病，食道是将食物从口腔输送到胃部的管道。胃-食管反流病的发生是由于胃酸回流到食道。



胃-食管反流病的发生是由于胃酸回流到食道

胃-食管反流病是美国最常见的食道问题。在美国，约有 20% 的人受到影响（每 100 人中有 20 人），其中包括婴儿和儿童。

### 导致胃-食管反流病的原因是什麼？

胃食管反流病通常是由下食道括约肌（LES）的问题引起的。这块肌肉是食道和胃之间的阀门。健康的下食道括约肌在您吞咽后会立即关闭，以防止反流。但是，如肌肉无力或在错误的时间放松，胃酸就会上升到食道。

以下这些情况都会引起胃-食管反流 GERD:

- 下食道括约肌或食道受损。
- 食道疝气，部分的胃通过横膈膜上的一个较大的孔洞被推到腹腔外。这将影响到下食道括约肌（LES），使其无法正常操作。并非每位有食道疝气的人都会发生胃-食道反流病。
- 肥胖或怀孕带来的体重过重和脂肪会压迫胃部。这可能会移动或对下食道括约肌（LES）造成压力。
- 飲食和生活方式的選擇會使症狀惡化（見下文）。

### 那些因素會使胃-食管反流病（GERD）惡化？

- 一些飲食的習慣，如：
  - 吃太多辛辣、脂肪或橙桔類食物
  - 吃太多含咖啡因、酒精的飲食和巧克力
  - 吃得過多
  - 吃飯時間太接近睡覺時間
- 使用任何種類的煙草
- 服用某些藥物
- 穿腰部太緊的衣服

### 胃-食道反流症（GERD）有那些症狀？

胃食管反流病（GERD）最常見的症狀是燒心。燒心是指胸骨後或腹部的疼痛感。其他症狀包括：

- 胸部疼痛
- 口臭及口內有泛酸味
- 進食後噁心
- 反胃（食物或胃酸從胃部進入食道）
- 打嗝
- 腹脹
- 吞嚥困難（吞嚥時疼痛或有問題）
- 聲音嘶啞或聲音變化
- 氣管問題：
  - 咳嗽
  - 清嗓子

- 肺炎
- 哮喘
- 肺部疾病

几乎每个人偶尔都会有反酸。如在 3 个月内每周有 2 次或更多的反酸，请与医生交谈。

## 胃食管反流病（GERD）还会出现那些其他问题？

- 时间久了，胃酸可能会伤害食道内敏感的内膜，这可能会引起食道炎（食道发炎、受刺激或肿胀），从而导致食道溃疡（疮口）。
- 胃酸对食道的损伤会形成疤痕组织。这可能会使食道更加狭窄，导致吞咽问题。
- 胃酸可以改变食道的细胞结构，使其变得更像胃和肠的内壁。这就是所谓的巴雷特氏食道症。它与食道腺癌（癌症）的高风险因素有关，尤其是在老年人中。
- 喉部的癌症
- 哮喘
- 肺呛入，即分泌物、食物或饮料或胃内物质上升到喉部（声带）和下呼吸道。
- 纤维化，一种在肺部组织中形成疤痕的疾病，导致严重的呼吸问题。

## 如何治疗胃-食道反流病 (GERD)?

起初，医生最常开出改变饮食和生活方式的处方，以治疗胃-食道反流病症（GERD）。也可能使用药物治疗。如这些方法都不奏效或效果不佳，医生则可能会建议您做手术。

以下是一些有助于减轻胃-食道反流病症状（GERD）的方法：

### 飲食改變

- 将体重保持在健康范围内
- 少吃多餐
- 少吃油腻、油炸、辛辣食物。
- 避免食用以下食物：
  - 辣椒
  - 葱类
  - 橙桔类
  - 巧克力

- 咖啡因
- 汽水类

请参阅我们的讲义“胃食管反流管理 Managing Reflux”，以了解更多有关胃食管反流病（GERD）的饮食指引。

### 改变生活方式

- 增加运动量
- 避免穿腰部太紧的衣服
- 至少在睡觉前 2-3 小时吃最后一餐
- 戒烟避免吸入二手烟
- 戒酒
- 抬高床头。睡觉时用枕头把头抬高到胸部以上

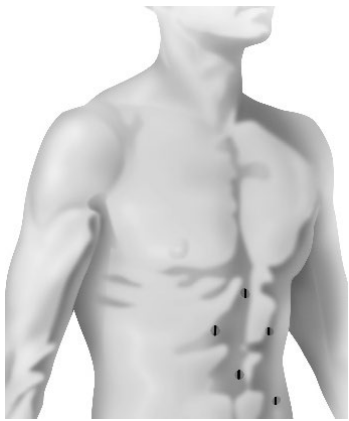
### 药物

医生可能会给您开一些药物来帮助减少胃酸。这些药物可以中和胃酸或阻止胃酸的产生。

- **抗酸剂 (Antacids)** 用于帮助控制轻度至中度烧心。医生可能会给您开抗酸剂，或者建议您使用无需处方即可购买的抗酸剂，如 TUMS、Mylanta 或 Alka-Seltzer。这些药物可以中和胃酸。但是，由于胃需要酸才能很好地运作，所以经常服用抗酸剂会影响对食物的消化。它们还可能导致腹泻和其他副作用。
- **组胺 H<sub>2</sub>-阻断剂 (Histamine H<sub>2</sub>-blockers)**（雷尼替丁 Ranitidine、西米替丁 Cimetidine、Zantac 和 Tagamet）对轻度的、偶尔的反流很有效。这些药物能阻断组胺 (histamine)，组胺是人体内的一种激素，能使胃细胞产生胃酸。这些药物不如质子泵抑制剂强（见下页）。
- **质子泵抑制剂 (Proton pump inhibitors)**（Nexium、Prilosec 和 Prevacid）。当胃-食道反流症 (GERD) 的症状属于中度至严重时，就会使用它们。它们是可以抑制胃酸分泌和释放的强效药物。
- **质子泵抑制剂 (Proton pump inhibitors)**（Nexium、Prilosec 和 Prevacid）当胃-食道反流症 (GERD) 的症状属于中度至严重时，就会使用它们。它们是可以抑制胃酸分泌和释放的强效药物。
- **黏膜保护剂 (海藻酸 alginic acid 和蔗糖酸硫酸铝悬液 sucralfate suspension)** 是覆盖在食道内侧的胶状物或泡沫。这样可以保护食道，防止胃酸反流损伤食道。



LINX 设备是一个灵活的磁珠环。



在腹腔镜手术中，会在您的腹部做几个微小的切口。

## 食道括约肌磁珠环植入术 (LINX Procedure)

食道括约肌磁珠环植入术 (LINX) 装置是用来帮助避免胃酸反流的。它是一个灵活的磁珠环。磁珠由钛合金链连接，当您吞咽或打嗝时，磁珠环就会打开。

此装置大约与美金 25 分钱币同样的大小。将它放置在胃部上方的食道外圆周位置（食道下括约肌）。磁珠环的磁力有助于薄弱的下食道括约肌 (LES) 保持关闭。这可以防止胃酸回流到食道。

但是，当您吞咽时，食物或液体的压力可以克服磁力的吸引力，磁珠就会分开。这样，食物和液体（咀嚼碎的食物）就能正常进入胃部。

### 微创手术

食道括约肌磁珠环植入术 (LINX) 采用腹腔镜（微创）方法，在腹部做几个微小的切口，而不是在腹部做一个大切口的开刀手术。外科医生经由这些小切口插入微小的器械和光纤摄像机。

食道括约肌磁珠环植入术 (LINX) 是门诊手术。患者不需要在医院过夜。除非出现问题，否则可在手术当天回家。

手术后完全康复大约需要 3 至 4 个月的时间。大约有 80% 的患者可能在手术后出现吞咽困难的情况（100 名患者中有 80 名）。这个问题会自行解决。

## 食道括约肌磁珠环植入术 (LINX) 后

### 在恢复室

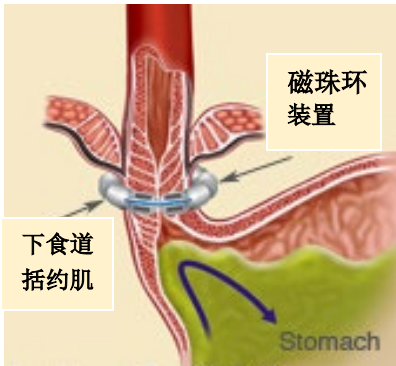
- 您在恢复室恢复 2 至 3 小时。就可回家。
- 您的家人可能允许到恢复室看望您。这取决于您的情况和当时恢复区里其他病人的护理情况而定。
- 当您醒来时，您会有：
  - 氧气罩提供额外的氧气。当肺部功能恢复后就换成鼻管输氧。
  - 静脉注射管 (IV) 在手术期间和手术后给予液体和药物。
  - 在您的腿上套有间歇性压缩套 (SCDs)。压缩套会不时充气来挤压腿部。这可以改善血液流动，帮助预防血栓。

### 呼吸的练习

我们会给您一个叫激励肺活量计的吹气机来帮助你锻炼肺部。锻炼肺部是很重要的、可预防肺部的问题如肺炎。

使用激励肺活量计的吹气机可预防肺部感染（肺炎）和其他问题。因此使用激励肺活量计是非常重要的。使用的方法：

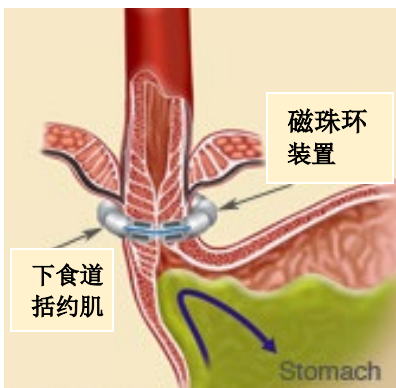
## 磁珠环系统是如何操作的



磁珠环 (LINX) 装置有助于下食道括约肌抵制胃酸的压力



磁珠环 (LINX) 装置可以扩张以便吞咽



吞下后磁珠环装置 (LES) 会立即关闭 LES

- 用嘴包含住管子然后吸气。呼吸会把一个小球升起。
- 更深地吸气会使小球停留的时间更长。深呼吸比浅呼吸更能锻炼肺部。

回家

遵循本手册中的自我护理指南，避免手术后出现问题。如有任何疑问，请致电您的手术团队。

- 除非有问题，否则我们希望您能在手术当天回家。
- 手术后会给您一张食道括约肌磁珠环植入术卡即 LINX 植入术卡。请随时携带此 LINX 植入术卡。如此卡丢失了，请致电您医生办公室补办一张卡。

驾车

- 手术后至少 2 周内不要开车
- 在服用处方止痛药（阿片类药物）时不要开车。这些药物会影响您的反应时间和做决定的能力。
- 当您确定您的反应时间正常时，您可以开始开车。

## 疼痛控制

- 伤口部位会有一些疼痛。轻微的疼痛可以服用对乙酰氨基酚 (泰诺 Tylenol) 或布洛芬 (Advil, Motrin) 来缓解疼痛。
- 在伤口处冷敷可以帮助缓解疼痛。如您使用冰块，不要直接放在皮肤上。先用毛巾把冰块包起来。每次敷冰 20 分钟，然后取下 20 分钟。
- 医生会给您开一种处方药（阿片类药物），以帮助缓解中度至重度疼痛。仅在对乙酰氨基酚或布洛芬不能控制疼痛时才服用这种药物。
- 如果您需要加服阿片类药物：
  - 在再开阿片类药物处方之前，医疗提供者必须通过电话或亲自为您做评估。
  - 如您已获准重新补拿阿片类药物，我们不能将处方传到您的药房。您必须亲自将处方送到药房。若要取得处方，您可以来医院领取，也可以打电话给我们，要求我们将处方邮寄给您。如您希望我们将处方邮寄给您，请务必在您需要补药前几天打电话给我们。
- 在手术后的头几天，您可能还会有肩膀疼痛。这是由手术时给腹部充气用的气体（二氧化碳）引起的。这种疼痛通常会持续 4 到 5 天。阿片类药物不能缓解这种肩部疼痛。如发生这种疼痛，我们建议步行、按摩该区域或使用加热垫。
- 有些止痛药会导致头晕。因此下床时要寻求帮助，以免摔倒。

- 有些处方止痛药会导致便秘。请遵照医嘱服用泻药。如开始出现大便溏薄即停止服用。

## 药物

- 食道括约肌磁珠环植入术（LINX）手术后应该不再需要抗酸药物：如 Nexium、Protonix 或 Prevacid。
- 您可以恢复所有其他常规药物，除非您的医疗提供者告诉您不要服用。
- 如医生开了抗生素处方，请继续服用，除非医疗服务提供者告诉您停止服用。重要的是要按照指示服用全部的抗生素处方药。

## 活动

- 食道括约肌磁珠环植入术（LINX）后 6 周内切勿举、推、拉 15 磅以上的重物。
- 慢慢地随着康复增加活动量，只要不引起太大不适或给腹部肌肉造成压力就可以了。以疼痛为准，如做某些事情导致疼痛就不要再做了。
- 走路很重要。手术后要尽快开始行走。每天步行超过 3 次总共至少 1 英里。
- 只要遵守注意事项，可以在手术后 2 周恢复性生活。

## 敷料和皮肤的护理

- 在腹部有 5 个小的伤口。手术后 48 小时后，可以取下敷料（纱布和水凝胶）。
- 敷料下面会有白色的胶带，称为免缝胶带（Steri-Strips）。切勿将它们撕掉。在 1 到 2 周内它们会自行脱落。

## 淋浴

- 手术后第二天可以洗澡。水凝胶伤口敷料（Tegaderm）是塑料的可以防水。
- 免缝胶带（Steri-Strips）亦可沾湿。淋浴后，请轻轻拍干免缝胶带（Steri-Strips），不要擦干
- 手术后 2 周内，或在伤口完全愈合之前，不要浸浴、游泳、坐在热水浴缸中，或浸泡伤口。

## 饮食和营养

避免长期流质的饮食。



## 手术当天

- 我们建议在手术后立即吃**软性免嚼饮食**，而且**仅在**食道括约肌磁珠环植入术（LINX）手术当天吃质地柔软的食物。我们的目标是减少咀嚼食物。
- 手术后第二天开始吃常规的食物。**必须即刻恢复吃正常的饮食，这一点非常重要。**这将有助于体内植入部位的愈合。
- 在手术后的 7 至 10 天内，很可能会出现吞咽困难、经常打嗝或胸痛。

## 手术后 1 至 2 周

我们称它为 "蜜月" 期。许多患者报告说，食物很好下咽。在这段时间里，我们建议您：

- 小口小口地吃
- 细嚼
- 慢咽
- 少吃多餐；每 2 至 3 小时吃一次。每天 5 至 7 次小餐。
- 不吃干的食物，如薯片、硬馒头和饼干。
- 在身边准备一杯饮料，以备您需要在进食时可以饮水帮助吞咽。
- 避免一次喝大量液体。一次喝太多水，可能会引起紧绷或不适。

## 手术后 3 至 8 周

- 此时会形成疤痕组织。这是件好事！这是身体的愈合方式。疤痕组织会在珠环装置周围形成一个胶囊。这可以防止它向上或向下移动。
- 可能会有一些吞咽困难、经常打嗝或胸痛。这是由于您的身体适应食道括约肌磁珠环植入术（LINX）装置时出现炎症和**水肿（肿胀）**造成的。
- 也可能会由于食道痉挛而引起胸痛。食道是一个肌肉组织。就如身体的其他肌肉一样，它可能会因为在手术过程中受到压力而痉挛。这种疼痛有时被描述为 "尖锐 " 或 "刺痛"，但它不会持续很长时间。
- 如感到食物 "粘住 " 或吞咽困难，请喝温水或茶。这可以帮助放松食道。

这些都是已知和预期的症状。保持饮食规律，少吃多餐以帮助缓解这些症状。

## 多餐

为了避免食道括约肌磁珠环植入术（LINX）装置结疤而固定在一个位置上，做 "物理治疗 " 很重要。那什么是食道括约肌磁珠环植入术（LINX）的物理治疗？

**进食！** 就像膝关节手术后膝盖的锻炼很重要一样，您必须通过经常进食来锻炼该装置。

持续的运动有助于此装置保持可移动状态。这可预防长期的吞咽问题。每次吞咽食物时，装置都会打开和关闭，拉伸疤痕组织。这有助最佳的愈合。

- 我们鼓励在一天中进食 **5 至 7 次** 小餐，大约每 **2 至 3 小时** 一次。
- 对于大多数患者来说，**吞咽困难**（吞咽问题）在手术后 **6 至 8 周** 左右最严重。在那之后，它应该开始改善。约百分之 **90** 的患者（**100 位** 患者中有 **90 位**）在 **12 至 16 周** 时吞咽困难即会消失。大多数患者在此时候能够顺利地处理食物而没有任何问题。
- 体验一下您的食物！吃各种不同的食物。

### 饮食提示

- **3 周内** 避免吃面包皮、各种面条、米饭和披萨。
- **3 周内** 避免吃牛排、水煮鸡或任何密度较大的肉类。如想吃这些密度较大的肉，可以用酱汁或液体炖煮使肉多汁液。
- 如在手术后即感到恶心，可以吃一些清淡的食物，如土豆泥、酸奶和鸡面汤。

### 可以尝试的食物

- 滑润的鱼类如：金枪鱼、鳕鱼、大比目鱼等。
- 肉末配肉汁、肉丸配肉酱。
- 肉饼
- 煮软切碎的意大利面条
- 蛋：炒蛋、摊蛋卷或奶酪蛋饼。
- 煮熟的蔬菜
- 香蕉，罐头水果，及芒果
- 汤，焖炖的食物

### 后续的门诊

您将会与手术团队有多次复诊。这些复诊是：

- **手术后 2 周：** 我们要确认手术后恢复良好。可能会开始出现吞咽困难的情况。
- **手术后 6 周：** 我们会监测进食的进展。吞咽困难已在高峰期或将开始缓解。

- **手术后 3 个月：**我们要确认进食有进展，任何吞咽困难亦逐渐缓解。
- **手术后 1 年：**我们要做一个**食道镜**（吞咽钡剂及 X 光射线）来检查食道括约肌磁珠环植入术（LINX）装置的状态。这项测试可以显示食道运作情况、吞咽能力以及装置的使用情况。

## 您可能有的疑问

**做了食道括约肌磁珠环植入术（LINX）后我还可以打嗝或呕吐吗？**

可以的。

**我会感觉到这植入的磁珠链吗？**

不会。

**我可通过机场的安检吗？**

可以，我们会给您一张植入磁珠链的证卡，以备有问题时可以显示出。

**这装置可以维持多久？**

它是用永久性的磁珠做的，它就是设计为永久不会磨损。

**我可以做核磁共振（MRI）吗？**

可以的，可以做核磁共振 MRI（核磁共振造影）扫描，**但必须告诉核磁共振（MRI）技术人员您有植入磁珠环**，这样他们就可以限制核磁共振 MRI 使用的磁铁强度（最高 1.5 特斯拉）。一些较新的核磁共振 MRI 机器使用更强的磁铁（3 特斯拉），这些机器需要避免。

## 何时需要与医生联系

如在接下来的 7 天内出现以下任何症状，请致电您的外科医生组团队：

- 不能吞咽食物或只能喝液体
- 不能保留喝下的液体
- 即使服用止吐的药物，还是会呕吐
- 呕吐物是带血的，或看起来像咖啡渣
- 背部或肩部疼痛不退
- 伤口出血量增加
- 胸痛或气喘
- 感到非常饱，腹部鼓胀
- 无法排便或大便稀拉



如有本页所列的任何症状，请致电您的外科团队。

- 大便呈黑色或柏油状
- 做站立动作时头晕或晕眩
- 一条腿或一只手臂发热、有触痛感、疼痛、肿胀或发红
- 任何的感染迹象：
  - 发烧超过  $37.8^{\circ}\text{C}$  ( $100.5^{\circ}\text{F}$ )
  - 颤抖或发冷
  - 伤口排液增加
  - 排液浓稠或有异味
  - 伤口周围发红或肿胀
  - 伤口部位或附近疼痛或触痛不断加剧-

如您认为有紧急事故，或危及生命的情况，请即刻拨打 **911**

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## 您有疑问吗？

我们很重视您的提问。如有疑问或顾虑请致电您的医疗提供者。

您外科医生诊所的电话号码：

工作日上午 8 点至下午 5 点，  
请拨打 206.598.4477，听到录音后请按 8。

非工作时间、周末和节假日，  
请拨打 206.598.6190，要求传呼外科 O 组。

# **LINX Procedure**

*A treatment for gastroesophageal reflux disease*

## **Contents**

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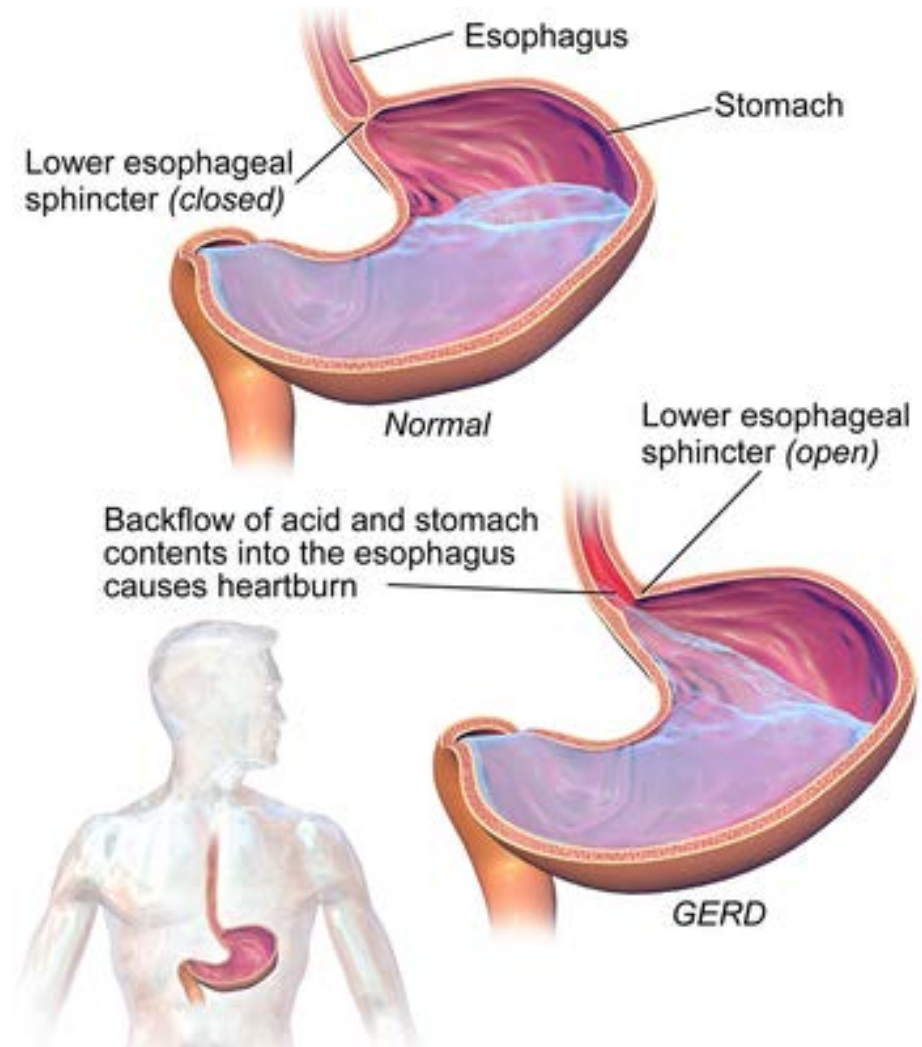
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*Talk with your doctor about any questions you have.*

## What is gastroesophageal reflux disease (GERD)?

*Gastroesophageal reflux disease (GERD)* is a condition that affects the *esophagus*, the tube that carries food from the mouth to the stomach. GERD occurs when stomach acid flows back into the esophagus.



*GERD* occurs when stomach acid flows back into the esophagus.

GERD is the most common esophagus problem in the United States. It affects about 20% (20 out of 100) of people in the U.S. This number includes infants and children.

## What causes GERD?

GERD is often caused by problems with the lower esophageal *sphincter* (LES) muscle. This muscle acts as a valve between the esophagus and stomach.

A healthy LES prevents reflux by closing right after you swallow. But, if the muscle is weak or relaxes at the wrong time, stomach acid can rise up into the esophagus.

All of these conditions can cause GERD:

- Damage to the LES or esophagus.
- A *hiatal hernia*, where part of the stomach pushes up through a large hole in the diaphragm and out of the abdominal cavity. This affects the LES and keeps it from working well. GERD does **not** occur in every person who has a hiatal hernia.
- Too much weight and fat from obesity or pregnancy can push on the stomach. This can move or put pressure on the LES.
- Acid and bile do not fully empty out of the stomach.
- Diet and lifestyle choices can make symptoms worse (see below).

### **What can make GERD worse?**

- Some eating habits, such as eating:
  - Too much spicy, fatty, or citrus food
  - Too much caffeine, alcohol, and chocolate
  - Large meals
  - Too close to bedtime
- Using tobacco of any kind
- Using some medicines
- Wearing clothing that is tight around your waist

### **What are the symptoms of GERD?**

- The most common symptom of GERD is *heartburn*. Heartburn is a feeling of pain behind the *sternum* (breastbone) or in the abdomen. Other symptoms include:
  - Chest pain or heartburn
  - Bad breath and a sour taste in the throat
  - Nausea after eating
  - *Regurgitation* (food or stomach acid comes up into your esophagus from your stomach)
  - Burping
  - Bloating

- *Dysphagia* (pain or problems when you swallow)
- Hoarseness or voice changes
- Airway problems
  - Coughing
  - Throat-clearing
  - Pneumonia
  - Asthma
  - Lung diseases

Almost everyone has acid reflux at some time. Talk with your doctor if you have reflux 2 or more times a week for 3 months.

### **What other problems can occur with GERD?**

- Over time, stomach acid can harm the sensitive lining of the esophagus. This can cause *esophagitis* (inflammation, irritation, or swelling of the esophagus), which can lead to *esophageal ulcers* (sores).
- Damage to the esophagus from stomach acid can cause scar tissue to form. This can make the esophagus more narrow and lead to problems with swallowing.
- Stomach acid can change the cell structure of the esophagus so that it becomes more like the inner lining of the stomach and intestine. This is called *Barrett's esophagus*. It is linked with a higher risk of esophageal *adenocarcinoma* (cancer), especially in older adults.
- Cancer of the larynx.
- Asthma.
- *Pulmonary aspiration*, in which secretions, food or drink, or stomach contents rise into the larynx (voice box) and lower respiratory tract.
- *Pulmonary fibrosis*, a disease in which scars are formed in the lung tissues, causing serious breathing problems.

### **How is GERD treated?**

At first, doctors most often prescribe changes in diet and lifestyle to treat GERD symptoms. Medicine may also be used. Your doctor may advise surgery if these things do not work or become less effective over time.

#### **Diet Changes**

- Keep your weight in a healthy range
- Eat smaller meals
- Eat fewer fatty, fried, and spicy foods



- Avoid foods such as
  - Peppers
  - Onions
  - Citrus
  - Chocolate
  - Caffeine
  - Carbonated beverages

See our handout “Managing Reflux” to learn more about dietary guidelines when you have GERD.

### **Lifestyle Changes**

- Exercise more.
- Avoid wearing clothes that fit tightly around your waist.
- Eat your last meal at least 2 to 3 hours before you go to bed.
- Quit smoking and avoid secondhand smoke.
- Stop drinking alcohol.
- Raise the head of your bed. Use a pillow to raise your head above your chest level while sleeping.

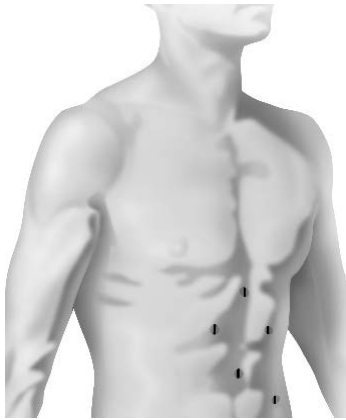
### **Medicines**

Your doctor may prescribe medicines to help reduce your stomach acid. These medicines either *neutralize* the acid or keep your stomach from producing them.

- **Antacids** are used to help control mild to moderate heartburn. Your doctor may prescribe an antacid, or advise you to use one you can buy without a prescription, such as TUMS, Mylanta, or Alka-Seltzer. These medicines neutralize stomach acid. But, because the stomach needs acid to work well, taking antacids too often can affect how well you digest food. They can also cause diarrhea and other side effects.
- **Histamine H2-blockers** (Ranitidine, Cimetidine, Zantac, and Tagamet) work well for mild, occasional reflux. These medicines block *histamine*, a hormone in the body that causes stomach cells to create acid. These are not as strong as proton pump inhibitors.
- **Proton pump inhibitors** (Nexium, Prilosec, and Prevacid) are prescribed when GERD symptoms are moderate to severe. They are strong drugs that suppress the secretion and release of stomach acids.
- **Mucosal protective agents** (*alginic acid* and *sucralfate suspension*) are gels or foams that coat the inside of the esophagus. This protects the esophagus from being damaged by refluxed stomach acid.



The LINX device is a flexible ring of magnetic beads.



In laparoscopic surgery, several tiny incisions are made in your abdomen.

## LINX Procedure

The LINX device is used to help prevent reflux. It is a flexible ring of magnetic beads. The beads are connected by titanium links that allow the beads to open when you swallow or belch.

The device is about the size of a quarter. It is placed around the esophagus just above the stomach (the *lower esophageal sphincter*). The strength of the magnets helps keep the weak LES closed. This keeps stomach acid from flowing back up into the esophagus.

But, when you swallow, the pressure of the food or liquid overcomes the magnetic attraction, and the beads separate. This lets the food and liquid (*bolus*) pass normally into the stomach.

## Minimally Invasive Surgery

Instead of open surgery, where a large incision is made in your abdomen, the LINX procedure uses a *laparoscopic* (minimally invasive) method. Several tiny incisions are made in your abdomen. Your surgeon will insert tiny instruments and a fiber-optic camera through these incisions.

The LINX procedure is done as an outpatient procedure. This means you do not need to stay overnight in the hospital. You can expect to go home the same day of surgery, unless problems occur.

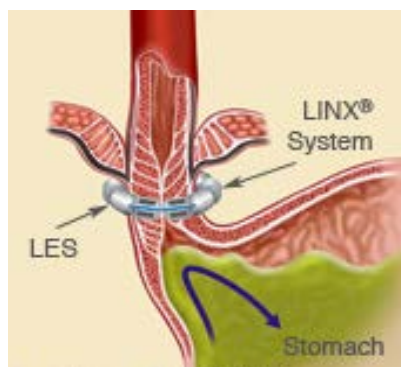
It takes about 3 to 4 months to fully heal from the surgery. You may have dysphagia (problems swallowing) after surgery. This occurs in about 80% of patients (80 out of 100 patients). This problem will resolve on its own.

## After Your LINX Surgery

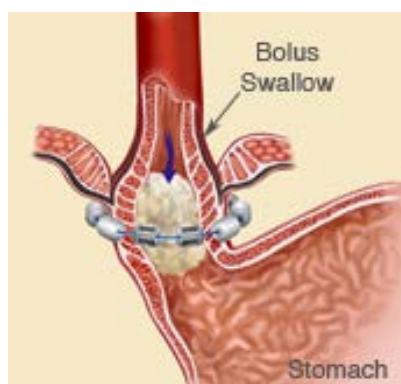
### In the Recovery Room

- You will spend about 2 to 3 hours in the recovery room before going home.
- Your family may be able to visit you in the recovery room. This depends on your situation and the care of other patients in the recovery room.
- When you wake up, you will have:
  - An **oxygen mask** over your face to give you extra oxygen. You will be switched to nasal prongs (oxygen under your nose) when your lungs are ready.
  - An **IV** to give fluids and medicines during and after surgery.
  - **Sequential compression devices (SCDs) on your legs.** These wraps are used to keep blood from pooling in the calves. This helps with blood flow and prevents blood clots. The wraps inflate from time to time and squeeze your legs.

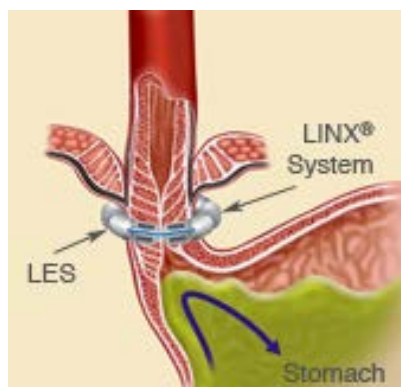
## How the LINX System Works



The LINX device helps the LES resist pressure from the stomach acid.



The LINX device expands to allow you to swallow food.



The magnetic beads close the LES right after you swallow.

## Breathing Exercises

You will be given a device call an *incentive spirometer* to help you exercise your lungs. **It is important to exercise your lungs to prevent problems such as pneumonia.**

Using the incentive spirometer will help prevent pneumonia and other serious problems. **It is very important to use it.** To use the incentive spirometer:

- Hold your mouth around the tube and inhale. Your breath will raise a small ball.
- Inhaling more deeply will make the ball stay up longer. Deep breathing exercises your lungs more than shallow breaths.

## Going Home

Follow the self-care guidelines in this handout to avoid problems after surgery. If you have any questions, please call your surgical team.

- We expect you to go home on the same day of surgery unless there are problems.
- You will receive a LINX Implant Card after your surgery. Carry your LINX Implant Card with you at all times. If you lose this card, please call your doctor's office to get a replacement card.

## Driving

- Do **not** drive for at least 2 weeks after surgery.
- Do **not** drive as long as you are taking prescription pain medicine (*opioids*). These medicines can make you sleepy, affect your judgment, and delay your reactions.
- You may begin driving when you feel that your reaction time is normal.

## Pain Control

- You will have some pain in your incision. For minor pain, you can take acetaminophen (Tylenol) or ibuprofen (Advil, Motrin).
- Cold packs on your incisions can help ease pain. If you use ice, do not place it directly on your skin. Wrap the ice in a towel first. Apply ice for 20 minutes at a time, then remove for 20 minutes.
- You will receive a prescription for opioid pain medicine to help control stronger pain. **Only** use opioids if acetaminophen or ibuprofen do not ease your pain.
- If you need a refill for opioids:
  - Before we can refill an opioid prescription, a provider must assess you, either over the phone or in person.

- If you are approved for an opioid refill, we cannot send the prescription to your pharmacy. You must take it to your pharmacy in person. To get the prescription, you can either come to the hospital to pick it up, or you can call us and ask us to mail it to you. If you want us to mail you the prescription, be sure to call us several days before you will need your refill.
- You may have some shoulder pain for the first few days after your surgery. This is caused by the gas (carbon dioxide) that was used to inflate your abdomen during surgery. This pain usually lasts 4 to 5 days. Prescription pain medicines do not have much effect on this shoulder pain. Walking, massage, and heating pads may be helpful if this pain bothers you.
- Some pain medicines can make you dizzy. Ask for help when you get out of bed so that you do not fall.
- Some prescription pain medicines can cause constipation. A laxative can help. Take the laxative as prescribed. Stop taking it if you start having loose stools.

### **Medicines**

- The LINX surgery should stop your need for antacid medicines such as Nexium, Protonix, or Prevacid.
- You may resume all of your other usual medicines, unless your healthcare provider tells you not to.
- If your doctor prescribes an antibiotic, keep taking it unless your provider tells you to stop. It is important to take the entire prescription as instructed.

### **Activity**

- For 6 weeks after your LINX procedure, do not lift, push, or pull anything that weighs more than 15 pounds.
- As you heal, slowly increase your activity as long as it does not cause a lot of discomfort or stress your abdominal muscles. Let pain be your guide. If something hurts, stop doing it.
- It is important to walk at least 3 times a day, for a total of at least 1 mile a day. Start walking as soon as you can after surgery.
- You may resume sexual activity 2 weeks after surgery, as long as you follow all activity precautions.

### **Dressing and Skin Care**

- You will have 5 small incisions on your abdomen. You may remove your dressings (gauze and Tegaderm) 48 hours after your surgery.

- You will have white tape called Steri-Strips under your dressing. Do not peel off these strips. They will fall off by themselves in 1 or 2 weeks.

### **Showering**

- You may shower the day after surgery. The Tegaderm dressing is plastic and will repel water.
- It is OK get the Steri-Strips wet in the shower. Gently pat them dry after showering. Do **not** rub them dry.
- Do not take a bath, go swimming, sit in a hot tub, or soak your incisions for 2 weeks after your procedure, or until the incisions are fully healed.

### **Diet and Nutrition**

**Avoid** going on a liquid diet.

#### **Day of Surgery**

- We advise a *soft mechanical diet* right after surgery and **only** for the day of your LINX procedure. With this diet, you will eat only foods that are physically soft. The goal is to reduce the need to chew your food.
- Start eating your regular foods the next day. **It is very important that you eat a normal diet right away.** This will help the implant site heal.
- For 7 to 10 days after your procedure, you will most likely have a hard time swallowing, more belching, or chest pain.

#### **Weeks 1 to 2**

We call this the “honeymoon” stage. Many patients report that food goes down well. During this time, we suggest you:

- Take small bites of food.
- Chew food very well.
- Eat slowly.
- Eat often – 5 to 7 small meals, every 2 to 3 hours.
- Eat very little dry food such as chips, hard bread, and crackers.
- Keep a drink nearby in case you need to sip liquids with your food.
- Avoid taking large amount of fluids at one time. Drinking too much at once may cause tightness or discomfort.

#### **Weeks 3 to 8**

- Scar tissue will be forming at this time. This is a good thing! This is your body’s way of healing. The scar tissue forms a capsule around the device. This keeps it from moving up or down.

- You may have some problems swallowing, more belching, or chest pain. This is caused by inflammation and *edema (swelling)* as your body gets used to the LINX device.
- You may also have chest pain that is caused by spasms of the esophagus. Your esophagus is a muscle. Like any other muscle in your body, it may spasm as a result of being stressed during the procedure. This pain is sometimes described as “sharp” or “stabbing,” but it does not last long.
- If your food “sticks” or you have problems swallowing, drink warm water or tea. This can help relax your esophagus.

These are all known and expected symptoms. Keep eating a regular diet and eat small meals often to help ease these symptoms.

## **Eat Often**

To keep the LINX device from scarring into a fixed position, it is important to do “physical therapy.” What is physical therapy for the LINX?

**EATING!** Just as it is important to exercise a knee after knee surgery, you must exercise the device by eating often.

Constant movement helps the device stay mobile. This will prevent long-term problems with swallowing. Every time you swallow food, the device opens and closes, stretching the scar tissue. This results in the best healing.

- We encourage eating 5 to 7 small meals throughout the day, about every 2 to 3 hours.
- For most patients, *dysphagia* (problems swallowing) is at its worst about 6 to 8 weeks after the procedure. After that, it should start to improve. By 12 to 16 weeks, dysphagia goes away in 90% of patients (90 out of 100 patients). Most patients are able to handle foods without any problem at this time.
- Experiment with your food! Eat a variety of different foods.

## **Diet Tips**

- Avoid eating bread crust, pasta, rice, and pizza for 3 weeks.
- Avoid eating steak, boiled chicken, or any dense meat for 3 weeks. If you want to eat any of these denser cuts of meat, moisten in stew with sauces or liquids.
- If you feel nauseated right after the procedure, eat bland foods like mashed potatoes, yogurt, and chicken noodle soup.

## **Foods to Try**

- Moist fish such as tuna, cod, and halibut
- Ground meat with gravy, meatballs with meat sauce
- Meat loaf

- Well-cooked, chopped spaghetti
- Eggs: scrambled, in an omelet, or in a quiche
- Cooked vegetables
- Bananas, canned fruits, and mangoes
- Soups, stews

## Follow-up Care

You will have several follow-up visits with the surgical team after your LINX procedure. These visits are:

- **2 weeks after your procedure:** We want to make sure you are recovering well from the procedure. You may start having dysphagia.
- **6 weeks after your procedure:** We will monitor how your diet is progressing. Dysphagia at its peak or will start to resolve.
- **3 months after your procedure:** We will make sure your diet has progressed and that any dysphagia is resolving.
- **1 year after your procedure:** We will do an *esophagram* (barium swallow X-ray) to check the status of LINX device. This study shows well your esophagus is working, how well you are swallowing, and how the device is working.

## Questions You May Have

### ***Can I belch or vomit with LINX?***

Yes.

### ***Can I sense or feel the implant?***

No.

### ***Can I go through airport security?***

Yes. We will give you an implant card to have with you, in case an issue arises.

### ***How long will the device last?***

It uses permanent magnets that are designed to never wear out.

### ***Can I have an MRI scan?***

Yes, MRI (*magnetic resonance imaging*) scans can be done, but **you must tell the MRI technicians about the device** so they can limit the strength of the magnet used in the MRI (up to 1.5 Tesla). Some newer MRI machines use a stronger magnet (3 Tesla), and these need to be avoided.



*Call your surgical team if you have any of the symptoms listed on this page.*

## When to Call Your Surgical Team

In the 7 days after your procedure, call your surgical team if you have any of these symptoms:

- You cannot swallow solid foods or can handle only liquids
- You cannot keep fluids down
- You are vomiting even if you are taking medicines to prevent nausea
- Your vomit is bloody or looks like coffee grounds
- You have back or shoulder pain that does not go away
- There is an increase in bleeding from your incision
- You have chest pain or shortness of breath
- You feel very full and your abdomen is bloated
- You cannot have a bowel movement or you have diarrhea
- Your stool looks black or tarry
- You feel dizzy or faint when you stand up
- One of your legs or arms feels warm, tender, painful, or it is swollen and red
- Any sign of infection:
  - Fever higher than 100.5°F (37.8°C)
  - Shaking or chills
  - Increase in drainage from your incision
  - Drainage that has become thick or smelly
  - Redness or swelling around the incision
  - Growing pain or tenderness at the incision site, or spreading away from it

**If you think you have an urgent, life-threatening condition, call 911 right away.**

*Illustrations in this handout are used with permission from TORAX Medical, Inc.*

### Questions?

Your questions are important. Call your doctor or healthcare provider if you have questions or concerns.

Your surgeon's office:

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Weekdays from 8 a.m. to 5 p.m., call 206.598.4477 and press 8 when you hear the recording.

After hours and on weekends and holidays, call 206.598.6190 and ask to page the Surgery O team.