

# Peri-operative pain in patients experiencing bariatric surgery

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## Abstract

A review of the literature was performed to identify follow-up studies on pain and bariatric surgery (gastric band, gastric sleeve or R-en-Y gastric bypass) as intervention. The main objective of this study was to find information on the prevalence of chronic pain in patients undergoing any of the mentioned surgical techniques and the incidence of chronic postsurgical pain after bariatric surgery.

16 studies were included for further analysis with over 2000 subjects. 2/3 of the information was on bypass surgery. "Short term" studies with data on pain within 3 months after surgery were randomized controlled trials (RCTs) comparing surgical techniques or analgesia. Pre-operative pain status had not been documented. However, peri-operative pain management was reported in detail. In 8 observational studies, pain data were available exceeding 3 months after surgery ("long term" studies). While pre-operative pain data were reported in the latter studies, in over half the anatomic location of the pain had not been specified.

An accurate estimation of the incidence of chronic postsurgical pain after bariatric surgery was not possible based on the available data. The number of comparable studies was low and the anatomic location of the pain had not been specified. Data on pain between 1 week and 6 months after surgery are lacking. This period is important, since it contains the time point after which the measured pain can be defined as chronic.

## Introduction

The number of patients undergoing a bariatric procedure for weight loss is still increasing, and nowadays also less overweight individuals are offered this treatment modality for conditions such as diabetes and the metabolic syndrome [1]. Improving its success rate requires attention for all post-surgical factors that hamper recovery and maintenance of weight loss over time. One of these factors might be chronic postsurgical pain (CPSP) [2-4].

Chronic postsurgical pain (CPSP) has been defined as pain persisting for more than 3 months after expected healing time [5]. Measuring chronic pain after surgery might involve up to 3 pain curves in an individual patient, depending on the time point of pain assessment [6]. In such a model, pre-operative and/or chronic postsurgical pain might be an issue in addition to the acute pain due to surgery. Patients planned for bariatric surgery for weight reduction, already suffer from a high prevalence of chronic pain conditions [7]. Abdominal discomfort might be a problem, as a pre-existing chronic condition or as surgery-related pain [8]. CPSP of the surgical site after bariatric surgery has been reported in up to 50% of the patients [9-11].

We are interested whether a transition from acute to chronic pain might contribute to postoperative complications requiring further attention. The focus of the literature search was on band, sleeve or bypass as surgical techniques, reportedly in use in most bariatric centers.

## Methods

The Pubmed, Cochrane and EMBASE databases were searched with search items "Bariatric surgery and pain or obesity surgery and pain

or gastric band and pain or gastric sleeve and pain or gastric bypass and pain" according to the guidelines by Liberati, *et al.* ([12], Figure 1) (closing date of the search: 26.07.2016). Abstracts in the English language were included for further analysis if the title indicated that a qualitative or quantitative analysis of pain in subjects, undergoing either of the mentioned surgical techniques had been performed (Phase 1 in figure S1). Case reports (as mentioned in the title or abstract), studies with a focus on re-operation or where subjects had simultaneous surgery for another indication were excluded.

Full text publications in the English language were analyzed for the study of pain and included if the pain-status had been documented at minimally three defined points in time in the same individual using the same pain assessment tool, and if data on pain were represented either in a graph or a table, or both (Phase 2 in figure S1). The surgical technique used should have been specified in relation to the reported data on pain. References from full-text publications were retrieved and included if of relevance ("cross references"). Reports with discrepancies between text and tables/figures were excluded.

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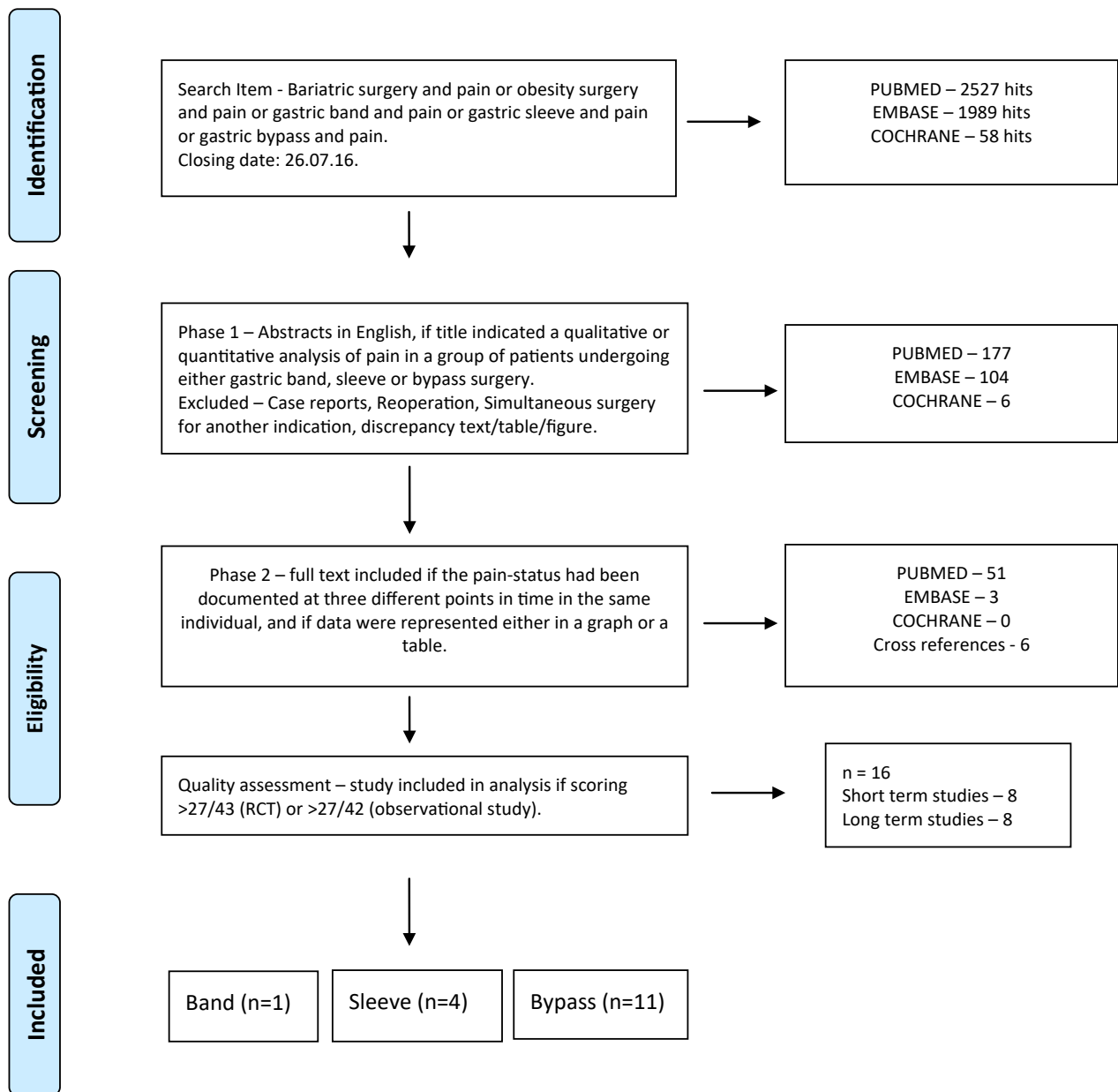


Figure 1: Prisma flow diagram.

Quality assessment was performed using a combination of adapted assessment tools for health care interventions, randomized controlled trials (RCTs) involving pain management and observational studies of interventional pain management [13-15]. Studies scoring over 65% were included for final analysis. Details on the adapted checklists can be found in the addendum. Lists of phase 1 and phase 2 references, and the scoring of the 60 phase 2 publications are obtainable from the authors on request.

## Results

Sixteen from 60 phase 2 studies scored over 65% and were included for further analysis (Table 1) [16-31]. Pain had been measured and recorded in over 2000 subjects in randomized controlled trials (RCT, n=7) or observational studies (n=9). Two publications shared (part of)

the same cohort [28,29]. Most references were found for the R-en-Y gastric bypass technique (including over 1700 subjects), followed by the band and sleeve techniques. In 8 “short-term” studies, data on pain were obtained within 3 months after surgery. The pain was scored on a 0 to 10 scale (10=most pain) within one week after surgery by an observer or the subject. In 8 “long-term” studies, data on pain were provided for the postoperative period exceeding 3 months. In these studies, the pre-operative pain status was reported as well. However, no further information on the location of the pain under investigation was provided in over half of these studies. While peri-operative pain management had been recorded in the short-term studies, such information was not available in the long-term studies (data not shown). Further meta-analysis on these 16 studies was not performed, due to the small number of studies with comparable study methodology.

**Table 1.** Phase 2 studies after quality assessment (n=16).

	Study type	surgical technique	Subjects	Pain assessment tool	Pre-operative data on pain	Last time point of pain assessment	Drop out
Short term studies			N=590				
Cabrera Schulmeyer <i>et al.</i> , 2010	RCT	lap sleeve	80	VAS	no	24 hrs	<10%
Naja <i>et al.</i> , 2014	RCT	lap sleeve	60	VAS	no	24 hrs	not mentioned
Cleveland <i>et al.</i> , 2015	RCT	lap sleeve	82	VAS	no	32 hrs	no details
Hassani <i>et al.</i> , 2015	RCT	lap bypass	60	VAS	no	6 hrs	0%
Zeidan <i>et al.</i> , 2013	Obs	lap bypass	114	NRS	no	24 hrs	16%
Albrecht <i>et al.</i> , 2013	RCT	lap bypass	57	NRS	no	2 days	<10%
Weingarten <i>et al.</i> , 2015	RCT	lap bypass	89	NPS	15/42 migraine	<1 week	<20%
Zotou <i>et al.</i> , 2014	RCT	open bypass	48	VAS	no	2 days	0%
Long term studies			N=1519				
Novack <i>et al.</i> , 2011	Obs	gastric band	29	MIDAS	yes	6 months	<30%
Burgerhart <i>et al.</i> , 2015	Obs	lap sleeve	20	VAS	no	2 years	no details
Lloret-Linares <i>et al.</i> , 2014	Obs	lap bypass	30	pain threshold	yes	6 months	20%
Ballem <i>et al.</i> , 2009	Obs	lap bypass	763	GI questionnaire	yes	5 years	>95%
Brissman <i>et al.</i> , 2016	Obs	lap bypass	41	% of subjects with pain	yes	2 years	32% at baseline
Olbers <i>et al.</i> , 2012	Obs	lap bypass	81	SF36	yes	2 years	0%
Risstad <i>et al.</i> , 2015	Obs	lap bypass	232	SF36	yes	2 years	56%
Kolotkin <i>et al.</i> , 2012	Obs	bypass	323	SF36	yes	6 years	39.60%

Lap: laparoscopic; Obs: observational; Continuous: continuous symptoms; GI: Gastro-intestinal questionnaire

## Discussion

Chronic pain after bariatric surgery for weight reduction is mainly analyzed in quality of life studies measuring bodily pain [32,33]. Improvement in general well-being is observed as early as 3 to 6 months after surgery [31,34,35]. While an initial increase in quality of life with a decrease in bodily pain is reported in the first year after surgery, contradictory observations are made in the few studies on larger cohorts of patients with specification of the pain location. Steele et al reported an increase in abdominal pain in the first year after surgery [36]. Data were derived from an administrative database including over 20,000 subjects undergoing bariatric surgery. Ballem, et al. showed an initial decrease followed by a slow increase in pain back to baseline levels 5 years after surgery in a survey of over 750 individuals undergoing laparoscopic bypass surgery [27]. In this latter study, the retention of subjects in later years was an issue, while in the former study the surgical technique that had been used, was not specified. Such information is important if studying postsurgical pain. Specific surgical techniques might influence recovery time in the acute postoperative period [37-39]. The length of pain exposure in the acute postoperative period is associated with the development of chronic postsurgical pain [40,41]. Optimal pain reduction in the acute postoperative period seems to be important, not only for fast recovery and rehabilitation in the short-term, but for the prevention of CPSP as well [42,43].

Treating acute pain after surgery appropriately, disguises its postoperative curve. This complicates the interpretation of the data obtained from the ample RCTs in bariatric surgery, which are mainly focused on pain reduction. A few studies indicate that recovery from acute pain after surgery might take place as early as 1 week after the band or sleeve technique [44,45]. However, at least 10% of the patients seem to remain at risk for CPSP after sleeve or bypass surgery [46,47].

While a substantial number of studies report data on peri-operative pain in relation to bariatric surgery, only part meets current quality criteria for randomized controlled trials or observational studies [14,15]. Additional research is needed with prospectively collected data using comparable pain assessment tools and performing follow-up with retention of subjects [5]. In such studies, the anatomic location of the pain should be taken into consideration to be able to interpret the

obtained data appropriately. Sufficient time points of pain assessment should be included to be able to study the postoperative pain curve adequately. Pain assessment between 1 week and 6 months after surgery deserves more attention since this period contains the conversion point after which the measured pain can be defined as chronic.

Traditionally, bariatric surgery has been reserved for those with major overweight not responding to diet and life style programs. Nowadays, surgery is also offered to those with metabolic morbidities, despite less overweight. In such patients, the balance between risks and benefits from surgery might even be more precarious, justifying the further exploration of postoperative complications such as pain.

## Disclosure

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## Conflicts of interest

None.

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