Smoking in bariatric surgery

On addictions, complications and weight loss

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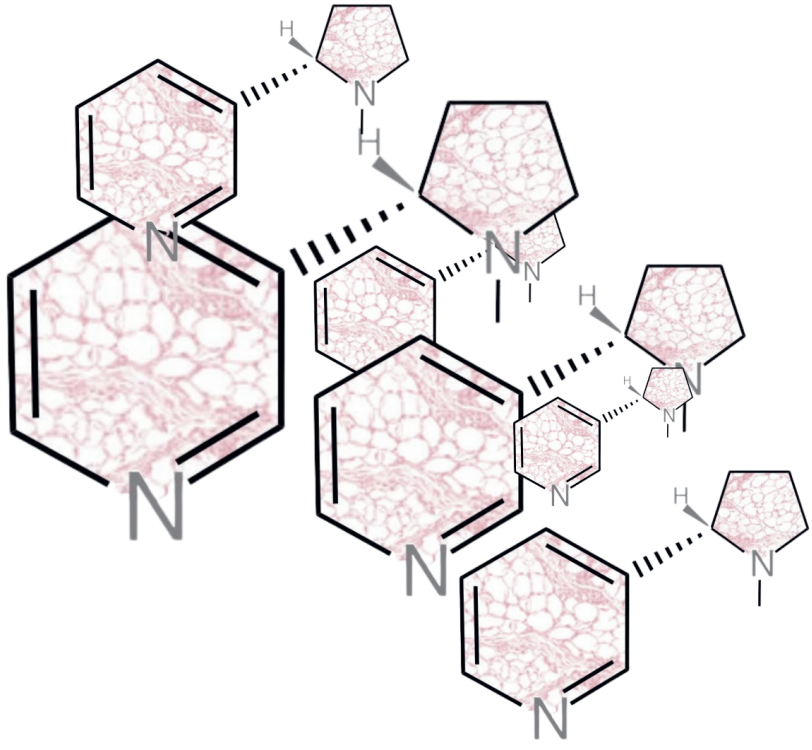
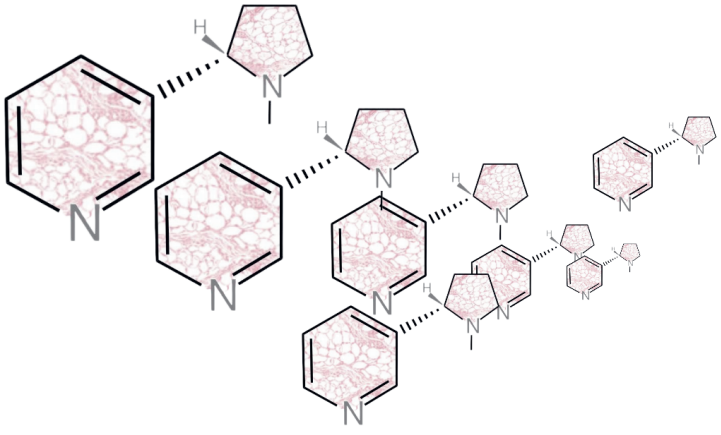


Chapter 9

General Discussion and Future Implications



General Discussion and Future Implications

The findings of the research projects described in the previous chapters and related literature, may have implications for prevention, clinical practice and future projects on smoking, smoking cessation advice, bariatric surgery and obesity. We will share our thoughts on implications for future research, especially in the field of tobacco use and morbid obesity or bariatric surgery.

Because the negative effects of smoking and obesity have overlapping properties and influence on overlapping pathways,[1-7] we hypothesized that smokers and non-smokers would differ regarding complications and bariatric surgery outcomes. Nevertheless, in this thesis overall only minor differences, and some specific differences, between these two groups were found, and smokers were not consequently at a disadvantage. With respect to weight loss even the opposite was found, as smokers lost somewhat more weight after bariatric surgery (chapter 2,3,5). However, this advantage in weight loss was relatively small, and lacks clinically relevant proportions—especially considering the long-term negative aspects of smoking.[1-4,6,8]

Additionally, some of our results suggest that there are indeed disadvantages for smokers; in chapter 4 we found higher complication rates in patients that smoked at least until 19 weeks prior to surgery, compared to patients that did not smoke; seven (29%) of the patients based on self-reported smoking, and 8 (33%) of the patients who smoked based on cotinine measurement had a complication, compared to 21 (17%) and 14 (12%) complications when not smoking was based on self-report and cotinine measurement, respectively (based on self-reported smoking: OR [95% CI] 4.9 [1.6-15.4], cotinine measured smoking: OR [95% CI] 3.4 [1.2-9.8]). Besides that, in patients that were referred for upper endoscopy because of complaints, smoking was associated with marginal ulcers. Of the patients with a marginal ulcer, 39.1% were smoking, compared to 22.0% of the patients with a normal endoscopy, OR (95% CI) 2.6 (1.1-5.9) (chapter 6). And lastly, in chapter 7, we suggested that smokers may have greater increase of gastrointestinal symptoms after RYGB —especially of eructation. A lot of these outcome measures, however, are surrogate outcome measures. To determine whether smokers are different from non-smokers in bariatric surgery, in the end, one would like to compare outcome measurements in the very long-term; such as premature death, the occurrence of cancers, and extra years of functional life. Nevertheless, because of limited follow-up time, surrogate and interim outcome measures are the best available. All in all, the differences in complications and weight loss between smokers and non-smokers were not pronounced.

One of the main findings in this thesis, is that several smokers concealed smoking on a written self-report and that this was dependent on the treatment phase. During the screening trajectory 27.5%

concealed smoking, 69.0% on the day of surgery, and 6.5% after bariatric surgery (chapter 4). Our literature search showed that most of the studies considering smoking and its outcomes rely on even less reliable medical chart review, and few studies rely on self-report. These findings support our suggestions that previous studies contain biased groups, and therefore, biased inference. When patients conceal behaviour that is influencing outcomes, in research, this underreporting will result in smaller differences than in reality between groups, or research will fail to detect the presence of existing differences. We expect that in the current studies smokers are wrongly categorized in the non-smokers group, especially during the phase before surgery. This misclassification may explain why smoking prevalences are divergent before and after surgery (between 1.2-62% and 8.1-43.3%, respectively), and also why the association between smoking and outcomes after bariatric surgery have conflicting results.[9-13] Other limitations of these studies were the sample size (and/or high attrition rate), and that timing of smoking and definition of smoking varied (or were missing). Therefore, the results of previous studies should be interpreted critically, with a range of uncertainty (chapter 2, 3, 4).

In all our questionnaire studies (chapter 2,3,4,5), answers were not visible for the attending doctor, and participants were informed about this. Therefore, we expect that the problem of incorrect self-report to the healthcare team could be larger in clinical practice. We assume that high quitting expectations from the health care team, embarrassment for failing to quit, fear for gaining weight as a result of the cessation, the stigma associated with smoking, fear for rejection contribute to social desirable responding.[14-18] Hence, in the studies (chapter 6,7) where we rely on medical charts, this problem could be more evident. The misclassification of smoking patients in clinical practice is a missed opportunity of unknown size; these patients do not receive information about possible positive effects of cessation, are not encouraged to attempt cessation and do not receive individualized support. We are convinced that this support and promotion of smoking cessation is important at all phases before and after bariatric surgery given the positive long-term general health consequences, even if effects on specific bariatric complications and body weight may be limited. Bariatric teams should be aware of the phenomenon that their patients may be more open about smoking after surgery and should ask for smoking habits also during the years of follow-up. For future studies on smoking we suggest that these studies use a clear definition, reliant and repeated measures for smoking, preferably by using a biomarker of nicotine (chapter 4).

Smoking Cessation in Bariatric Surgery

When?

Hospital policies on smoking cessation timing before surgery differ widely. A lot of studies in the field of bariatric surgery focusing on the effects of smoking did not report definition of smoking, and did not report their policy on smoking cessation (chapter 4). Clearly, the goal of smoking cessation is to reverse the impairment of organs and improvement of the harmful effects; in the peri-operative phase, especially the effects of smoking on lung function, immune function, vascularization, thrombosis, and wound healing.[6,19-22] We assume that a dose-response relation exists; that there is different impact of heavy smoking compared to occasional smoking. Additionally, smoking cessation has demonstrated to improve the negative effects caused by smoking, already shortly after the cessation and increasingly with the continuation of the cessation.[20,21] In order to determine these dose and timing effects, next studies should specify the exact timing of cessation and success rates, based on reliable smoking measurements. With solid data on time of cessation before surgery, one could establish whether the duration of smoking cessation before surgery is influencing the risk of complications after surgery, and what the impact of heavy- versus light smoking is. Based on our studies, it is not possible to recommend a specific period of time of smoking cessation before surgery; however, it is certainly possible that our current policy of a strict smoking cessation two weeks before surgery is not long enough.

How?

Our studies about attitudes and beliefs about smoking cessation showed that some differences between smokers and ex-smokers exist, for instance regarding the beneficial effect of smoking cessation, the experienced support and amount of smokers in their direct social environment (chapter 2,3). Willingness to quit depends on social and cultural ideas; a lot of psychological theories have tried to simplify the process towards behavioral change, such as in smoking cessation.[18,23-28] Future (qualitative) studies should expand the knowledge about these attitudes of smokers and former smokers. Why do smokers hesitate to quit, how could we reset frustrating beliefs that interfere short- and long-term successful smoking cessations? What factors contributed to the final successful smoking cessation in former smokers? How could a relapse be prevented?

One of the plausible concerns in smokers, is the weight gain after smoking cessation, on average 4.5kg especially within the first 6 months.[4,14,29,30] Therefore, smoking cessation support should not only comprise of good education about negative effects of smoking, the beneficial effects of smoking cessation and possible medical support strategies (buproprion, also registered for weight loss treatment in combination with naltrexone).[7,31] Additionally, the support should also involve cognitive behavioural therapy (CBT) focusing on the concerns about the weight gain after cessation, since

patients with these concerns who were treated with CBT accomplished to gain less weight compared to patients who were treated with a therapy focusing on the weight gain itself.[14,30] In chapter 2 and 3 we demonstrated that both smokers and former smokers used several and a divergent number of methods. In other words, one single solution that achieves a lifelong smoking cessation for all smokers does not exist, and whether a specific intervention is more effective in (a subgroup of) bariatric surgery patients should be investigated in future studies. For bariatric surgery patients, we suggest this intervention should include education about the complex addictive and behavioural components of smoking, medicinal support and CBT specifically focusing on the fear of weight gain.

Addiction in Bariatric Surgery

From the perspective of addiction, relapse of an addiction is not uncommon.[31] In our studies, smoking prevalence ranged from 8.4%-25.6% before surgery, and from 12.5%-17.5% after surgery (chapter 2, 3, 4, 5, 6, 7). We demonstrated that shifts in smoking behavior occur; patients (temporarily) stop or resume smoking before and after surgery (chapter 2, 3, 7). Addiction is characterized by inability to consistently abstain, impairment in behavioral control, craving, diminished recognition of significant problems with one's behavior and interpersonal relationships, and a dysfunctional emotional response.[32,33] As stated in chapter 5, possibly 'food addiction' induces a subtype of obesity, whereas addiction and obesity have overlapping properties.[32-36] Neurotransmitters implicated in drug-seeking behaviors are also implicated in food intake and, conversely, peptides that regulate food intake also influence the reinforcing effects of addictive drugs. Neurotransmitters implicated in addictive behaviours involve among others dopamine, endogenous cannabinoids, opioids, gamma-aminobutyric acid and serotonin, as well as hormones and neuropeptides involved in homeostatic regulation of food intake, such as insulin, leptin, ghrelin, PYY, glucagon-like peptide-1.[31,32,34,37] Volkow suggested that these overlapping properties are competing, thus the presence of one may protect against the presence of the other.[34] Since smoking cessation changes rewarding value of (added sugar and fat) food,[1] we hypothesized that treating obesity, as a consequence, may trigger relapse or new onset of addiction; particularly when treating the symptoms of food addiction, without adequately addressing potential underlying psychopathology.[11] On the other hand, individuals who suffer from dysfunction of the neuronal mechanisms as response to exposure to an addictive substance could be susceptible for more than one addictive behavior.[34] In chapter 5, we saw that this was not specifically the case for smoking patients before bariatric surgery. In the group that was not operated were considerable more smokers, alcohol users and addictive drugs users, which is possibly due to the selection bias (patients with uncontrolled addiction should be treated before they get approval for surgery). Cross-addiction is a well-described theoretical phenomenon after bariatric surgery, but this theory has also

been criticized.[32-34,36,38] After bariatric surgery, patients have an increased risk to develop substance use disorder, well-described is alcohol use disorder. Besides the alteration of the rewarding value of food and the inability to achieve reward by eating,[32-34,36,38] other mechanisms that contributes to new onset/transfer of addiction are the pharmacokinetic changes after RYGB.[38,39] Additionally, same patterns have been demonstrated for opioids, marijuana, and the use of hypnotics and sedatives; after bariatric surgery both new-onset use and higher amounts have been described.[40-46] Preoperative risk factors to develop substance use disorder (SUD) postoperatively are history of SUD or familial SUD.[39,47] Interestingly, one study showed that TWL was higher in a group of patients with previously adequately treated SUD; perhaps these patients are capable to apply the acquired strategies in a different context, which supports them to adhere to the necessary behavioural adaptations and protects them from new-onset addictions as well.[48] Since the use of substances, whether the use is at a level of a disorder or not, may lead to several serious medical issues, it is important to assess these potentially addictive behaviours regularly both before and after bariatric surgery, and inform patients about these risks.[38,40-46,49-54]

Considering the abovementioned, next studies should specify the type of addictive drugs use, both before and after bariatric surgery. Withstanding that these are—like smoking—socially sensible subjects,[15] preferably with the help of a toxicological screening (chapter 4, 5).

In this thesis, all studies were observational with all inherent limitations. Especially, no conclusions on causality can be drawn. Naturally, we shared our thoughts–based on studies in- and outside the bariatric surgery field—about possible ways through which smoking could influence bariatric surgery outcomes. We have discussed at a lot of different pathways how smoking could impact these bariatric surgery outcomes: due to alterations in immune function and pulmonary function, cardiovascular effects (chapter 2,3,4,7),[1-4,6,19-22], limited metabolic effects (chapter 3),[1,4], and direct effects on gastrointestinal tract and microbiota (chapter 6, 7),[55-59]. In addition, we approached the possible effects of smoking from the perspective of addiction,[31-37] and as a behavioural alternative for eating[1] (chapter 3,7). To further explore the influence of smoking on bariatric surgery outcomes, we suggest future research in the field of bariatric surgery focus attention on these possible pathways, while using reliable smoking measurements.

Obesity: From Health Promotion to Health Protection

Unfortunately, because bariatric surgery alone is unable to accomplish a turnaround, the problem of obesity is one for the next generations. Current preventive and treatment strategies are unable to stop the increase, let alone to decrease it.[7,60,61] Currently, only severe obese patients are possibly eligible for surgery, and less severe patients not, while the incidence of obesity is still increasing.[60,62] Additionally, when children are obese—and more and more are—they have higher risk to be obese as an adult as well.[63] We need to change this tendency. In developing and developed countries, we urgently need better prevention ánd treatment strategies.[7,60] It could help when we approach the problem of obesity as a global complex disease, an insufficient adaptation of our species to altered environmental conditions,[60,64] in contrast to the current liberal individual attitude, where individuals are regarded responsible for their own health and weight.[65-67] Good education—for persons with and without obesity—could help to change the attitude towards obesity. We should take into account the complex mechanisms that cause and maintain obesity.[60] Knowledge of possible contributing internal and external factors may stop us from judging.[65,66] Additionally, we should be willing to sacrifice 'sugar and fat' cold turkey. We propose to adapt a mindset (expressed in mind and money) that obesity is a disease that needs to be treated and prevented, while patients wíth obesity should be supported and accepted. Bariatric surgery is a last resort for a lot of patients, who—in vain—have struggled against the obesity for a long time. Recently, bariatric surgery even has proven to be effective as treatment of morbid obesity in adolescents.[61] The heterogeneous group of eligible patients that is operated, is supposed to benefit from surgery in the long-term.[68,69]

Indeed, bariatric surgery is a safe and the most effective option to treat morbid obesity.[7,70,71] Nonetheless, bariatric surgery it is not an easy solution; the key to success lays in a lifelong, life-changing change of lifestyle. Weight regain, deterioration of comorbid disease are common issues after several years. While bariatric surgery is in fact an effective *secondary preventive* operation, it also comes with a lot of possible complications in the short- and long-term, and demands a lifelong strict adherence to eating regulations.[9,45,61,71-79] Therefore, education about obesity should not only focus on the rectification of stigma's about obesity, but also about the stigma's regarding bariatric surgery,[67] since it is—for obvious reasons—increasingly popular.

In the end, however, if we would be able to prevent obesity, it would not be necessary to seek for safe and effective treatments, like bariatric surgery. Yet, the agreed measures in the Dutch National Prevention Agreement to reduce the prevalence of childhood and adult obesity in the period between 2018 and 2040, try to empty the ocean with a thimble.[80,81] To formulate measures, the Dutch Government installed a committee with 70 stakeholders—including delegations of the food industry, supermarkets, and catering companies.[80,81] In the agreement many measures are unspecific and rely

on self-regulation of the (commercial) stakeholders. For those measures that are specific, the calculated impact in the long-term is minimal.[80,81] Therefore, to reverse obesity, we believe that the Dutch Government needs to formulate stronger regulations, which acknowledge the complexity of the problem, and should be based on predicted impact, without interference of the commercial lobby. As Blüher stated: 'The obesity epidemic will not be reversed without government leadership'.[82]

We need to protect our future generation, since they are our future. This generation is worth a cold turkey quit of smoking ánd added sugars and fat. Some even propose a relapse of a hunter-gatherer way of living.[64] If only it were that 'simple'.

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