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Surgical treatment of benign colorectal polyps 2008–21

ORIGINAL ARTICLE

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Background

Colorectal cancer is one of the most common forms of cancer in Norway, and typically develops from colorectal polyps. For benign colorectal polyps, endoscopic removal is recommended to avoid unnecessary surgery. This study identifies the extent of surgical treatment of benign polyps in the period 1 January 2008–31 December 2021.

Material and method

We obtained statistics from the Norwegian Patient Registry on the surgical resection of benign colorectal polyps, number of colonoscopies performed and number of patients with the diagnostic code for benign polyp in the study period. Population size from Statistics Norway was used to calculate annual incidences of the procedure.

Results

The number of patients with benign polyps increased from 211 per 100 000 population to 444 per 100 000 during the study period. The number of colonoscopies increased from 9.4 per 1 000 population to 16.7 per 1 000. The number of surgical resections of benign colorectal polyps per year increased from 4.2 per 100 000 population to 6.3 per 100 000. The total number of unique patients with benign polyps in the period was 215 736, of which 2.1 % received surgical treatment, with the figures varying from 2.0 % in 2008 to 1.6 % in 2021.

Interpretation

Our results show that surgical treatment of benign polyps is still widespread in Norway. This impacts on patient safety and health economics. We propose the establishment of multidisciplinary teams and enhanced endoscopic competence in Norwegian health trusts.

Main findings

The number of colonoscopies performed, adjusted for population growth, increased by 78 % from 2008 to 2021, and the number of patients with benign polyps increased from 211 per 100 000 population to 444.

Of patients with benign polyps, 2.1 % underwent surgical treatment, with a variation from 2.0 % in 2008 to 1.6 % in 2021.

The number of surgical resections of benign colorectal polyps increased from 4.2 per 100 000 population in 2008 to 6.3 in 2021.

Colorectal cancer is the third most common form of cancer globally, and the incidence in Norway is one of the highest in the world (1). Colorectal polyps can potentially develop into colorectal cancer.

Until the 1980s, the standard treatment for large colorectal polyps was surgical resection of the affected segment of the colon. However, with the introduction of flexible colonoscopy, structured training and increasingly advanced colonoscopy equipment, endoscopic removal has been recommended in internationally recognised guidelines for several years (2–4). Consequently, surgery is now considered overtreatment for benign polyps (2–4).

Endoscopic treatment is less resource-intensive and has a lower risk of complications than surgical resection (2, 5). International studies show a complication rate of 25 % (of which 14 % are severe) and mortality of 0.7–1.4 % after surgical treatment of benign polyps (6–8). In contrast, endoscopic treatment of benign polyps larger than 2 cm has a complication rate (perforations and bleeding) of 8 % and mortality of 0.08 % (9).

The introduction of a national colorectal cancer screening programme has highlighted the importance of high-quality treatment for colorectal polyps. The first invitations to participate in the programme were sent out in May 2022. The programme is being rolled out gradually, and in 2024 all 55-year-olds in Norway will be invited to screening in the form of an immunochemical faecal occult blood test (iFOBT), which is repeated every two years over a ten-year period. Participants with a positive test are offered a colonoscopy. The purpose of the screening is early detection of cancer and removal of benign polyps to prevent the development of colorectal cancer.

Screening is a balance between advantages and disadvantages. In order for the screening programme to achieve its goal with the fewest possible disadvantages and appropriate use of resources, it is crucial that benign polyps are not overtreated with surgery (2, 5). Through this study, we map the extent of surgical treatment of benign colorectal polyps in the period 1 January 2008–31 December 2021.

Material and method

We requested aggregated statistics from the Norwegian Patient Registry (NPR) at helsedata.no for all patients who had undergone surgical colorectal resection with a registered diagnostic code for benign colorectal polyp (ICD-10: K63.5, D12.x, K62.1) in the period 1 January 2008–31 December 2021. The patients were categorised by regional health authority and for Norway as a whole (Table 1). The statistics showed the number of patients per year for each procedure, the number of bed days per year and mean bed days per patient per year. Median figures for bed days were not requested. In order to prevent the inclusion of patients who underwent surgery for colorectal cancer in addition to benign polyps, we only included patients where the specified diagnoses were the primary diagnosis.

Table 1

Number and type of surgical procedures with diagnostic code for benign colorectal polyp (ICD-10: K63.5, D12.x, K62.1) performed in the period 1 January 2008–31 December 2021. Some patients have more than one procedure code, therefore the number of procedures performed (*N* = 4929) is greater than the total number of patients (*N* = 4566). TEM = transanal endoscopic microsurgery. TAMIS = transanal minimally invasive surgery.

Surgical procedure for benign colorectal polyp	No. (%)
Right-sided hemicolectomy	1 999 (41)

Surgical procedure for benign colorectal polyp	No. (%)
Sigmoid resection	647 (13)
Rectal resection	568 (12)
Ileocecal resection	402 (8)
Colectomy	302 (6)
Local extirpation of lesion (not TEM/TAMIS)	291 (6)
Appendectomy	267 (5)
Left-sided hemicolectomy	253 (5)
Rectal amputation	122 (2)
Transverse resection	78 (2)
Total number of procedures	4 929 (100)

We also sought aggregated statistics from the NPR on the number of colonoscopies (JUF32 and JUF35 (UJF32 and UJF35 before 2015)) for the period 1 January 2008–31 December 2021, regardless of indication for the procedure.

We did not include patients diagnosed with carcinoma in situ (ICD-10: D01) because histopathological assessment following resection often shows malignancy in such cases. We also excluded patients who had undergone transanal endoscopic microsurgery (TEM) or transanal minimally invasive surgery (TAMIS) (JGA 73 Transanal local extirpation in the rectum and JGA 85 Transanal endoscopic full-wall excision), because these are organ-preserving minimally invasive surgical procedures.

We did not request statistics for patients with a diagnostic code for benign colorectal polyp with treatment type not specified. To complete the picture, we therefore obtained additional information on the number of unique patients diagnosed with benign colorectal polyp (ICD-10: K63.5, D12.x, K62.1) from publicly accessible patient registry statistics for our study period (10).

To calculate the incidence of procedures per capita, we obtained population figures (total population and population aged over 40 years) for Norway as a whole and for each regional health authority for the study period from Statistics Norway's open database. We used population figures as of 1 January for each of the relevant years.

Permission and ethics

All aggregate statistics are anonymous. Statistics were requested from the NPR and were supplied following a decision to provide anonymised health data. It was not therefore necessary to seek prior approval from the ethics committee or data protection officer.

Statistics and analyses

The proportion of patients who underwent surgical removal of benign colorectal polyps was calculated by dividing the number of surgical procedures by the number of polyp diagnoses in unique patients per year throughout the study period.

We calculated the number of surgical resections for benign colorectal polyps per 1 000 colonoscopies performed for the whole country and for each regional health authority. We also calculated the number of surgical resections for benign colorectal polyps per 100 000 population over the age of 40 for Norway as a whole and for each regional health authority in each of the years of the study period. All analyses were performed using Stata version 17.0 (StataCorp, College Station, Texas, United States).

Results

In the period 1 January 2008–31 December 2021, a total of 215 736 unique patients were registered with a diagnostic code for benign colorectal polyp. During this period, the number of unique patients with a diagnostic code for benign polyp per year increased from 211 per 100 000 population (n = 9983) in 2008 to 444 per 100 000 (n = 22 009) in 2021. The number of surgical resections of benign polyp per year also increased from 4.2 per 100 000 population (n = 198) in 2008 to 6.3 per 100 000 (n = 342) in 2021. Overall, the surgical procedures entailed 53 242 bed days. Mean bed days per patient after surgical resection of a benign polyp was 10.1 for the entire period (from 12.1 days in 2008 to 7.8 days in 2021).

During the study period, 4566/215 736 (2.1 %) patients underwent surgical removal of benign colorectal polyps. The proportion of patients undergoing this procedure decreased from 2.6 % in 2011/2012 to 1.6 % in 2021 (Figure 1). The annual number of surgical resections of benign polyps per regional health authority is presented in Figure 2. This figure shows that the number increased throughout the study period in all regional health authorities except Northern Norway Regional Health Authority.

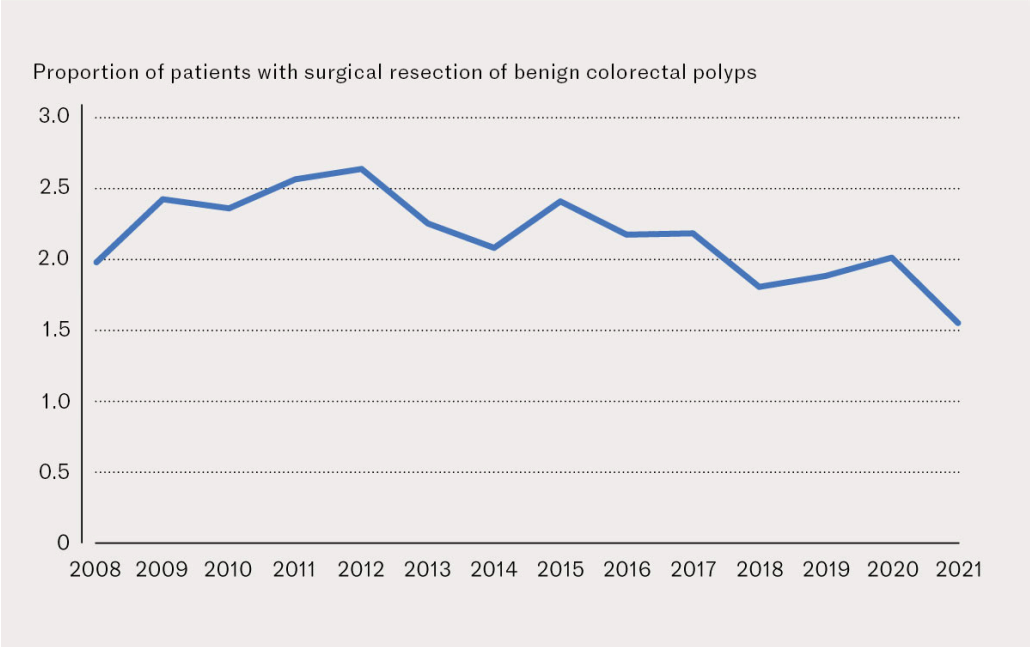

Figure 1 Proportion of patients with the diagnostic code benign colorectal polyp undergoing surgical resection in the period 1.1.2008–31.12.2021.

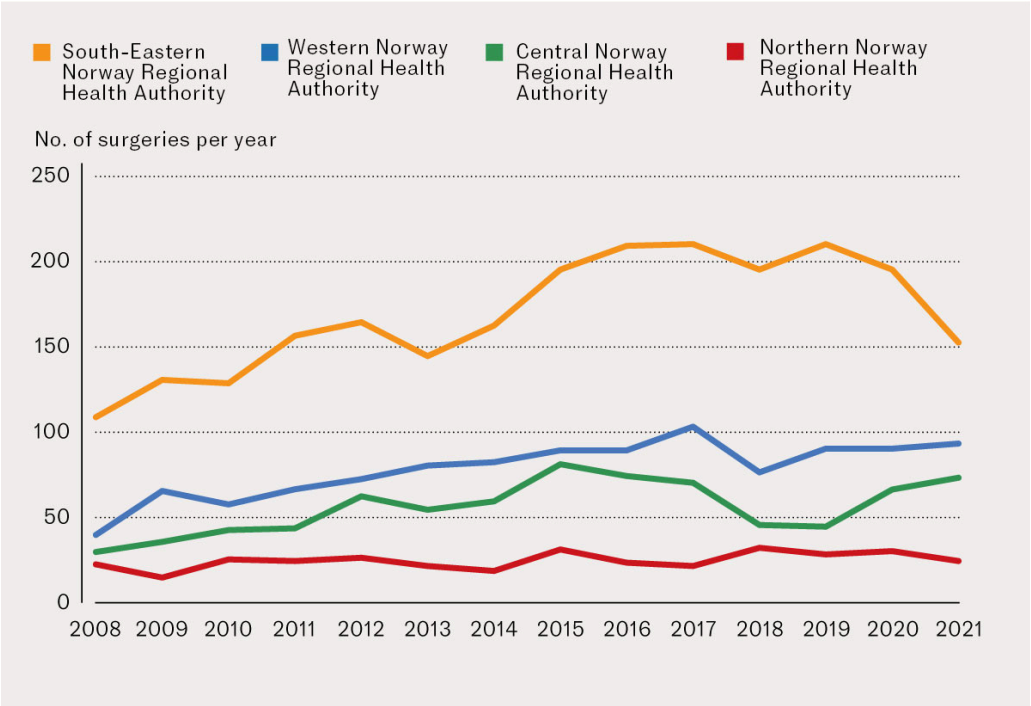

Figure 2 Number of surgeries for benign colorectal polyps per year per regional health authority in the period 1.1.2008–31.12.2021.

The number of colonoscopies in Norway for all indications increased from 9.4 per 1 000 population (n = 44 326) to 16.7 per 1 000 (n = 90 158) from 2008 to 2021, which corresponds to a population-adjusted increase of 78 %. Standardised for population size, Western Norway Regional Health Authority had the largest increase in the number of colonoscopies (99 %), but in 2021, the incidence was relatively similar across all regional health authorities (range: 15.8–18.5 per 1 000 population). The number of surgical resections per 1 000 colonoscopies was stable throughout the study period, with an average of 4.6 out of 1 000 colonoscopy patients undergoing surgery for a benign polyp during the study period (Figure 3).

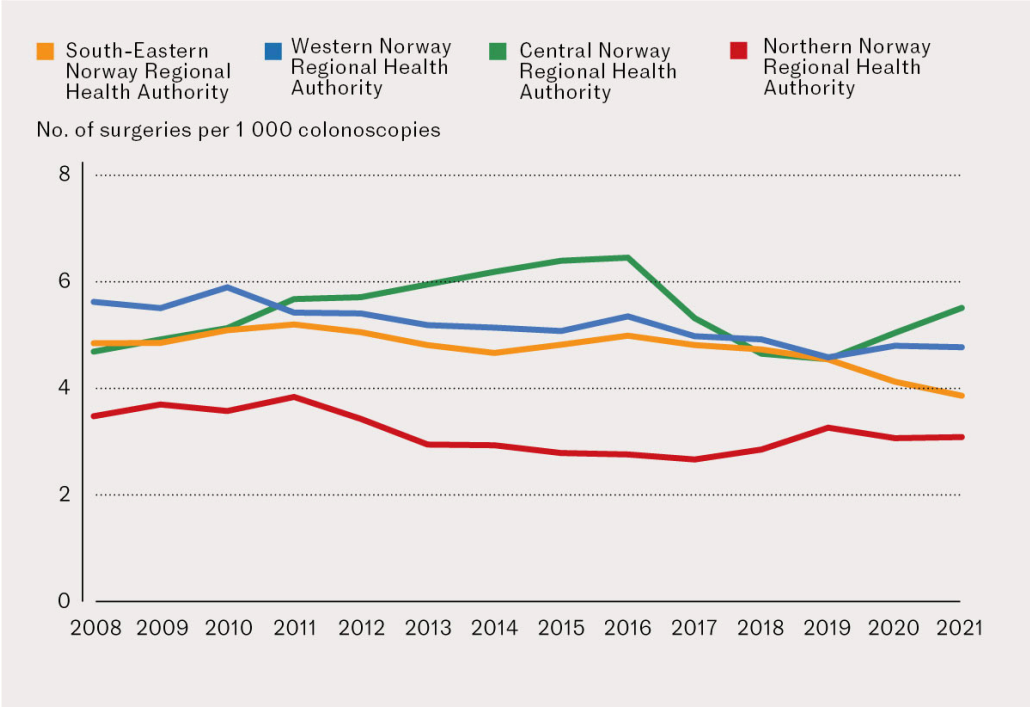

Figure 3 Number of surgeries for benign colorectal polyps per 1 000 colonoscopies and per regional health authority in the period 1.1.2008–31.12.2021.

Among the population aged over 40 years, the variation in the incidence of surgical treatment for benign colorectal polyps between the regional health authorities increased from 2008 (8 to 12 per 100 000 population) to 2021 (11 to 19 per 100 000 population) (Figure 4). Central Norway Regional Health Authority and Western Norway Regional Health Authority had the highest incidence of surgery per capita throughout the study period.

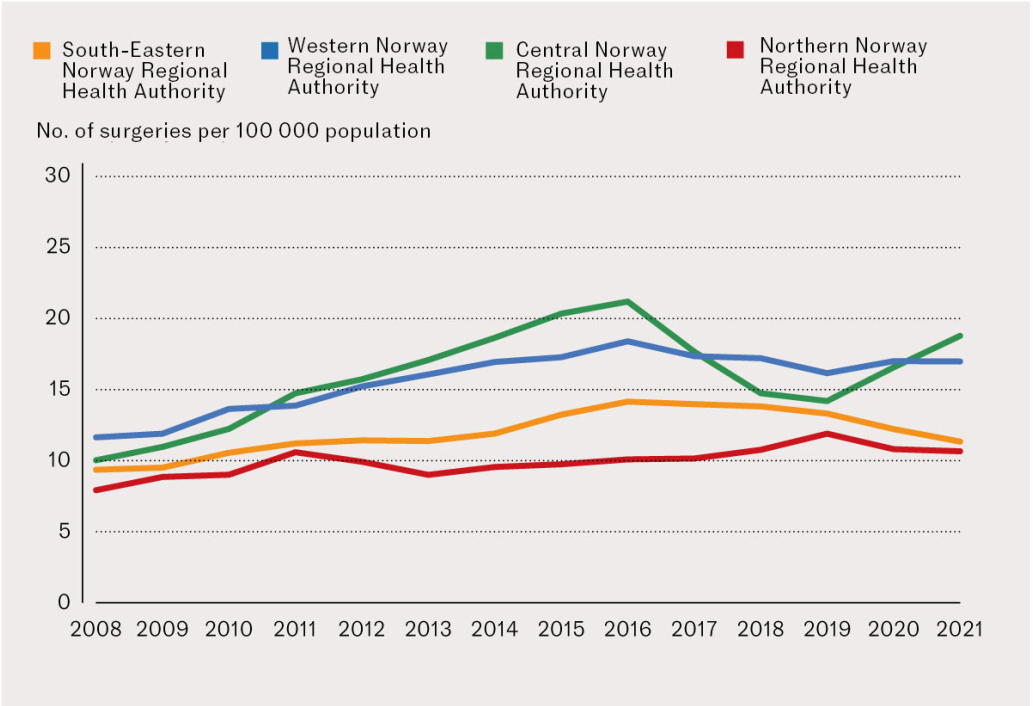

Figure 4 Number of surgeries for colorectal polyps with benign indication per 100 000 population aged over 40 years per regional health authority in the period 1.1.2008–31.12.2021.

Discussion

Our results show that 2.1 % of patients diagnosed with benign polyps during the study period underwent surgery. The figures varied from 2.0 % in 2008 to 1.6 % in 2021. Despite the slight reduction in the rate of surgical procedures, the total number of surgeries is going up due to the rise in diagnosed cases. Approximately 90 % of colorectal polyps are small and can be easily removed endoscopically (11). The remainder are complex (large polyps that are technically challenging to remove endoscopically) and require a higher level of endoscopic competence. A meta-analysis of 49 studies showed that 97.3 % of complex polyps are successfully treated using endoscopic methods (12, 13). Based on these figures, only 0.3 % of all benign colorectal polyps will require surgery, assuming that there is access to adequate endoscopic expertise. An incidence of surgery of 2.1 % can therefore be regarded as too high.

Surgical resection of benign polyps leads to higher rates of complication and mortality, without improving treatment effectiveness (6–8, 14, 15). Furthermore, endoscopic methods reduce the risk of severe late complications after surgical resection (16).

If a malignant polyp requiring completion surgery is treated endoscopically first, this does not result in a poorer prognosis for the patient (17).

Our results are supported by studies from the United States and the Netherlands (18, 19). Various factors could explain the high incidence of surgical treatment. Studies show that the main factors for surgical treatment are polyp size > 20 mm, polyp in the right colon, high-grade dysplasia and sessile morphology (15, 20). These studies indicate that the endoscopist's competence and decisions impact on how many patients with benign polyps are referred for surgery. Furthermore, research shows that the inclusion of polypectomy experts in interdisciplinary polyp discussions on treatment options can reduce overtreatment of benign polyps (21–23). Two Norwegian studies have documented the need to increase competence in endoscopic polyp treatment in Norway (24, 25). In order to improve competence, the Norwegian Endoscopy School initiated polypectomy training for endoscopists in 2020, and interdisciplinary polyp discussion groups were recently established in Western Norway Regional Health Authority and South-Eastern Norway Regional Health Authority (26).

In order for colorectal cancer screening to reduce the incidence and mortality of the disease, preventing surgical overtreatment of benign polyps is crucial (2, 5). A Danish study suggests that the benefits of colorectal cancer screening may be negated by the increased mortality associated with surgical complications (27).

One of the requirements of the colorectal cancer screening programme is that a plan must be in place to manage complex polyps (28), but it is up to the individual health authorities to determine how such competence should be developed and maintained (28).

Our results show a high incidence of surgery for benign polyps, and this has financial ramifications. Endoscopic methods reduce bed days, sick leave, complication rates, long-term morbidity and loss of future capacity to work (29–31). In the United States, the estimated cost of surgical treatment for a benign polyp is approximately NOK 230 000 per patient (29, 31), compared to NOK 80 000 for endoscopic treatment (29, 31).

In our study, mean bed days after surgery for benign polyps have been reduced from more than twelve days (2008) to less than eight days (2021). However, compared to endoscopic treatment, which is mostly performed on an outpatient basis, the number of bed days remains high. In 2019, the mean cost of one bed day in a Norwegian hospital was NOK 18 175 (32). The 4566 patients in our study had a total of 53 242 bed days, giving a bed-day cost of over NOK 970 million (in 2019 kroner), which corresponds to NOK 69 million per year. Our study also shows an increase in colonoscopy activity during the study period (from 44 326 colonoscopies in 2008 to 90 158 in 2021). Colonoscopy activity, and thus also the number of diagnosed polyps, is set to increase further due to the introduction of colorectal cancer screening. If the incidence of surgery for benign polyps is not reduced, increased colonoscopy activity will significantly compromise health economics.

Endoscopic examination waiting lists, a shortage of available expertise and long travel times to a unit with the necessary expertise can all lead to patients being referred for surgery for benign polyps. A lack of DRG (diagnosis-related group) points for endoscopic polypectomy and thus underfunding of endoscopic treatment can also be a factor (33).

In our study, we used statistics from the NPR, which has near complete coverage for procedures performed in Norway. Our data source contains publicly accessible statistics in Norway that are used for research, quality measurements and decision-making. However, it is possible that diagnostic codes are less precise than procedure codes and that polyps may be miscoded in our data sources, with invasive cancer lesions incorrectly being coded as benign polyps. If incorrect coding has occurred, we see no reason why the proportion of miscoding would differ across the various regional health authorities or over time during the study period.

Some patients may have additional indications for surgery, such as other intestinal cancers, hereditary polyposis syndromes or inflammatory bowel disease. Nevertheless, this applies to only a small number of patients, and the proportion is likely to remain constant over time. Finally, we must consider the fact that some surgeries may have been performed after unsuccessful attempts at endoscopic treatment or as a result of complications from endoscopic treatment.

Conclusion

Our study found that surgical resection of benign polyps is increasing in Norway, despite endoscopic methods being the recommended treatment for this patient group. This is leading to more complications, higher costs and less effective colorectal cancer screening than intended. We propose systematic

quality improvement in the form of interdisciplinary polyp discussion groups and enhancing endoscopic competence in all regional health authorities with a view to improving the treatment of patients with benign colorectal polyps.

The article has been peer-reviewed.

Mette Kalager is an editor for the Journal of the Norwegian Medical Association and has been involved in the editorial process for this article.

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