BMC Oral Health

RESEARCH

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Attitude and practice of dentists in patients taking oral antiplatelet and anticoagulant medications

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Abstract

Purpose In everyday practice, dentists are confronted with the dilemma of patients on antiplatelet and anticoagulant agents who require dental procedures.The present survey aimed to exhibit Turkish dentists' awareness and attitude towards patients using blood thinners prior to dental procedures and point out the significance of this issue.

Methods An electronic survey was administered to dental practitioners. Demographics, career details, answerbacks to medical consultation and agents consisting of 20-questions investigating approaches to patients using antiplatelet and anticoagulant agents were recorded.Data were collected in the online platform and analyzed.

Results A total of 500 dentists answered the survey, of which 48.2% were female and 51.8% were male. %57.8 of all respondents inaccurately marked warfarin as an antiplatelet agent. In patients who underwent coronary stent implantation,24.6% of dentists unfortunately stated that they always discontinue the actual medications before surgery. The majority of cardiology consultants interrupted the drug 5–7 days before the intervention in patients receiving antiplatelet therapy.16.6% of consultants made a decision based on international normalized ratio (INR) level of the patients using direct oral anticoagulant (DOAC).

Conclusion Although dental procedures do not posses a high bleeding risk and can be safely performed without interruption of blood thinners, there is an overestimation of the risk of bleeding by the dentists.It's understood that a considerable number of participants are not familiar with the blood thinners, coagulation tests and perioperative management.

Keywords Anticoagulants, Antiplatelets, Direct acting oral anticoagulants, Dentists' attitude, Oral surgery

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Introduction

Antiplatelet and anticoagulant agents have been increasingly used for prophylaxis and treatment of several different health problems.The number of percutaneous coronary interventions is also increasing and those patients with coronary stents should also use antiplatelets for stent thrombosis protection lifelong [1].

Oral anticoagulants are mainly used for thromboprophylaxis in patients with atrial fibrillation, venous thromboembolism and pulmonary embolus.Although vitamin K antagonist warfarin is still widely used, direct acting oral anticoagulants (DOACs) such as dabigatran, rivaroxaban, apixaban and edoxaban has been increasingly popular [2].

Although those blood thinners provide protection from thrombotic/thromboembolic events, they expose patients to varying degrees of bleeding risk as expected. Thus in a similar manner with surgeons, dentists also often recommend discontinuation of these agents preoperatively because of the potential for excessive perioperative bleeding. However discontinuation of anticoagulants may cause fatal complications in patients with prosthetic heart valves and recent deep vein thrombosis. On the other side DOACs may be stopped for few days in patients having atrial fibrillation with rather low thromboembolic risk [3].Some authors [4]suggest that dental procedures considered as low bleeding risk operations can be performed without discontinuing DOACS or by skipping only the morning dose.

Perioperative management of antiplatelet agents is much more complicated than it's thought to be. Cessation of antiplatelets especially in the prothrombotic perioperative period may be associated with mortal complications. A considerably high proportion of myocardial infarction due to coronary stent thrombosis occur in the perioperative period carrying high mortality rates.Thus, various societies of both surgery and dentistry advise not to discontinue antiplatelet agents perioperatively whenever possible [5].Despite evidence of fatal ischemic coronary or cerebral events due to premature cessation of antiplatelets, dentists frequently consult with cardiologists to interrupt the drugs due to concerns of excessive bleeding. However, it has been shown that the long-held belief of preoperative withdrawal of antiplatelet drugs is not supported by clinical evidence and that bleeding in dental procedures can rather be managed with local hemostatic measures [1]. Another major flaw in this issue is to come across with cardiologists consultation recipes bridging antiplatelets with low molecular weight heparin (LMWH) derivates. Replacing an antiplatelet with an anticoagulant is like comparing apples and oranges, thus several cases of myocardial ischemic events in patients bridged with LMWH have been reported in the literature in the last decades [6].

As summarized above, perioperative approach in patients using blood thinners is continuing to be on the horns of a dilemma. Aiming to exhibit the situation in our country and point out the significance of this issue we made the present survey questioning Turkish dentists' attitude towards patients using blood thinners prior to dental procedures.

Methods

Bezmialem Vakıf University Ethics Committee approved the study in accordance with the Declaration of Helsinki (54022451-050.05.04-). Informed consent to participate was obtained from all of the participants in the study. The scope of this survey included the dentists' awareness and attitude towards the management of patients using oral antiplatelet or anticoagulants and their periprocedural approach regarding to the dental treatment.

To ensure content validity and to avoid confusion on the statements, a pilot study was conducted on three oral and maxillofacial surgeons and two periodontologists with a cumulative experience of 25 years and five dentists with 5-years-experienced in dentistry. After the dentists' feedback, the questionnaire was revised.The latest version of the survey was transferred to SurveyMonkey® and distributed to the dental population via a web link on the digital platform. Participation was completely voluntary. Respondents' answers were collected anonymous. To prevent duplicate entries, the SurveyMonkey® platform was configured to restrict multiple submissions from the same browser and IP address. While participant anonymity was preserved, these technical measures helped ensure that each response represented a unique individual.

A 20-question semi-structured questionnaire was specifically designed by the authors for this study, consisting primarily of closed-ended questions. (Tables 1,2,3). Multiple choice options were presented in certain questions(#8, #9, #12, #16). Sophisticated design and rules were established to arise the initial thought and to prevent repetitious data from the same respondent. Two questions (#17, #18) were related to direct acting oral anticoagulant agents. If the surveyed dentist have encountered patients using those agents and answered ''yes" to the question, responses to the following two questions were mandatory. Otherwise, they were allowed to skip these two questions. Incomplete questionnaires were excluded to assure the accuracy of the analysis.

Statistical analysis Data were collected in the online platform, exported into a Microsoft EXCEL spreadsheet(Microsoft Corporation) and analyzed. Descriptive statistical analysis was used to report the responses. Statistical software(InStat Version 3.10

Table 1 Main characteristics of the study population

Question	Answer	%
Gender (#1)	Female	48.2
	Male	51.8
Experience (#2)	1–9 years	41.6
	10–19 years	30.4
	20–29 years	14.6
	30–39 years	9.4
	40–49 years	4
Career (#3)	General dentist	65.6
	Specialized dentist	13.2
	Research assistant	12
	Academician	9.2
Specialty (#3)	Oral and maxillofacial surgery	20
	Periodontology	5.8
	Endodontics	4
	Pedodontics	4.6
Health care facility (#4)	University	22.7
	Private office or clinic	68.8
	Public hospital	8.5

- GraphPad Software) was used to analyze the data collected.

Results

Descriptive properties of the study's population The questionnaire was sent to a total of 1.442 dentists. Five hundred respondents answered the full questionnaire between October 3, 2019 and July 15, 2021, of which 48.2% were female and 51.8% were male. The median practice experience of the participants was 10 years (range 1–49 years) (Table 1)0.22.7% of the surveyed dentists worked in University hospitals, 8.5% worked in state hospitals and 68.8% participants had private practice. Oral and maxillofacial surgeons constituted the majority of the specialists in the study (20%) (Table 1).

Dentist's knowledge about the agents Majority of the participants correctly indicated aspirin(%76.1) and clopidogrel(%54.4) as an antiplatelet agent, however %57.8 of all respondents inaccurately marked warfarin, which is an anticoagulant drug. Among antiplatelet agents, ticagrelor(%10.7) and prasugrel(%14) were ticked up by fewer participants.Among frequently prescribed analgesics,63.4% of the surveyed dentists indicated that paracetamol is appropriate to be used in patients taking blood thinners. However 43.1% of participant stated that they used nonsteroidal anti-inflammatory drugs (NSAIDs) (Table 2).

Dentist's perception and attitude Majority of the respondents(70%) encountered patients using blood thinners at least once a week (Table 2).Most participants (61.6%) consulted patients taking blood thinners and executed recommendations of the medical consultants. More than a quarter of the participants (32.6%) performed dental interventions without any interruption if bleeding risk of the procedure was not high.A few dentist (3.6%) preferred to stop blood thinners without requesting any medical advice, whereas 2.2% of the participants did not modify the drug regimen in any procedure and continue medications in every case (Table 2).93.1% of the participants indicated the hemorrhagic risk of the procedure while requesting for medical consultation (Table 2). In patients who underwent coronary stent implantation within six months, 68.8% of the participants preferred to continue antiplatelet agents prior to dental interventions. 24.6% of dentists stated that they always discontinue the actual medications before surgery(Table 2).27.8% of participants answered ''yes" to the question asking whether tooth extraction can be performed without any interruption in a patient using warfarin for mitral valve prosthesis, if INR level is 3 (Table 2).Considering the management of patient under DOAC therapy, 51.6% of surveyed dentists adhered to the medical advice of cardiologists. 16.4% of them stated that there is no need to discontinue the agent if INR value is within limits. 15.6% of participants performed dental interventions without interrupting DOAC if the bleeding risk is not high. 62.1% of participants have never encountered a patient treated with DOAC (Table 2).

Dentist's knowledge about coagulation tests 25% of the participants asked for bleeding time and platelet function analysis, and 4.6% responded that no test is needed. 39.3% of all requested INR in patients using antiplatelet medications (Table 2)0.46% of the participants request INR in patients receiving oral anticoagulants. More than half of the dentists (52.3%) did not take any test prior to the consultation with the prescribing physician (Table 2). When asked about INR levels to perform tooth extraction in patients under continued warfarin therapy, only 10.5% of the participants responded 3, 3.5 or 4 as an upper limit for INR (Table 2). 56.9% needed INR ≤ 2 and 7.3% needed INR ≤ 2.5 to perform tooth extraction without interrupting warfarin therapy.

Consulting with medical colleagues The majority of cardiology consultants interrupted the drug 5–7 days before the intervention in patients receiving antiplatelet therapy (58.2%). There were a considerable amount of responses bridging antiplatelet medication with low molecular weight heparin (21.9%).A minority of consultants (8.8%) recommended continuation of those drugs prior to surgery.6.3% of physicians left dentists to make their own decision according to the hemorrhagic risk of the procedures and thromboembolic risk of the patient (Table 3).Bridging with low molecular weight heparin was a frequent advise in patients using warfarin (46.3%). 25.7% of participants stated that if bleeding risk is low and INR

Table 2 Survey questions and answers. INR, international normalized ratio; DOAC, direct acting oral anticoagulants, NSAID: Non-steroid anti-inflammatuar drug * Multiple options were applied in the marked questions which a total number can exceed 100

Question	Answer	%
Frequency of encountering patients using blood thinners (#5)	Every day	25
	Once a week	45
	Once a month	30
What would be your approach before tooth extraction in a patient using blood thinners? (#6)	Decide after consulting with prescribing physicians	61.6
	Continue actual treatment if bleeding risk is not high	32.6
	Discontinue by themselves	3.6
	Always continue actual therapy in every case	2.2
Do you always indicate bleeding risk in medical consultation? (#7)	Yes	93.1
	No	3.9
	No idea	3
Knowledge about antiplatelet agents * (#8)	Aspirin	76.1
	Clopidogrel	54.4
	Warfarin (an *anticoagulant agent*)	57.8
	Ticagrelor	10.7
	Prasugrel	14
	Edoxaban (DOAC)	9.5
	Rivaroxaban (DOAC)	14.6
	Dabigatran (DOAC)	12.9
	Apixaban (DOAC)	13.1
Blood tests in patients using antiplatelets * (#9)	Bleeding time	19.4
	Platelet function analysis	5.6
	No test is needed	4.6
	INR	39.3
	Prothrombin time	25.7
	Thrombin time	5.6
	Thrombocyte count	11.9
	Partial thromboplastin time	21.1
Continue antiplatelets in patients with coronary stents implanted within six months (#11)	Agree	68.8
	Disagree	24.6
	No opinion	6.6
Blood tests in patients using anticoagulants * (#12)	INR	46
	Prothrombin time	22.6
	Partial thromboplastin time	19.3
	Bleeding time	19
	Consultation with medical doctor prior to blood test	52.3
	Thrombocyte Platelet count	5.5
	Platelet function analysis	1.3
	Anti factor Xa level	3.4
	Thrombin time	5.7
Management of patients under warfarin therapy undergoing tooth extraction (#13)	No upper limit for INR to perform tooth extraction	2.7
	If INR ≤ 2 no interruption	56.9
	If INR ≤ 2.5 no interruption	7.3
	If INR ≤ 3/3.5/4 no interruption	10.5
	No idea	22.6
Continue warfarin in patients with mitral valve prosthesis, if INR is 3 (#14)	Agree	27.8
	Disagree	72.2
Approach to patients using DOACs? (#16 and #18)	Consult with prescribing physicians	51.6
	Continue actual therapy, if INR is within normal range	16.4
	No need to discontinue if bleeding risk is not high	15.6
	Never encountered with DOAC	62.1

Table 2 (continued)

Question	Answer	%
Knowledge about frequently prescribed analgesics * (#19)	Paracetamol	63.4
	NSAID	43.1
	Opioid	3.7
	No idea	10,1
Necessity for a national guideline (#20)	Yes	90.1
	No	9.9

Table 3 Medical consultation suggestions for the management of patients using blood thinners prior to dental interventions. INR, international normalized ratio; DOAC, direct acting oral anticoagulants; LMWH, low molecular weight heparin

Drug	Answer	%
Antiplatelet agents (#10)	Discontinue 5–7 days preoperatively	58.2
	Continue actual therapy	8.8
	Discontinue and bridge with LMWH	21.9
	Decision left to dentist based on hemorrhagic and thromboembolic risks	6.3
	No idea	4.8
Warfarin (#15)	Discontinue 5–7 days preoperatively	16.8
	Continue warfarin if bleeding risk and INR level is within desired range	25.7
	Discontinue and bridge it with LMWH	46.3
	Decision left to dentist based on hemorrhagic and thromboembolic risks	1.1
	No idea	10
DOACs (#17)	Continue DOAC if bleeding risk is not high	10.1
	Continue DOAC regardless of bleeding risk	15.6
	Discontinue DOAC	16.4
	Just skip the last dose of DOAC	6.2
	Discontinue DOAC and replace it with aspirin	1.6
	Discontiue DOAC and bridge with LMWH	12.5
	Decision made based on INR level of the patient	16.6
	No idea	21

is within desired range (3–4), all dental procedures may performed without any interruption or modification of the regimen. Discontinuation of warfarin 5–7 days prior to the intervention without heparin bridging was stated by 16.8% of the respondents (Table 3).Regarding the management of patients on DOAC therapy prior to dental interventions, 10.1% of consultants advised to operate without stopping the drug if the bleeding risk is not high. 15.6% of them allowed the dentist to operate without any interruption regardless of bleeding risk. 16.4% of them solely stopped using this medication. 12.5% of medical colleagues recommended discontinuing the drug one or two days before operation and bridging with low molecular weight heparin. 16.6% of consultants made a decision based on INR level of the patients (Table 3).

About 90% of the surveyed dentists stated that there is a necessity to have a national guideline on management of patients using blood thinners and require dental treatment in Turkey (Table 2).

Discussion

The number of patients with cerebrovascular or coronary heart disease is growing worldwide. Those have to use different blood thinners lifelong. Naturally, dentists are increasingly faced with such patients and have to decide upon the management of those agents perioperatively [5].The perioperative approach to blood thinners is still being a conflicting issue for medical practitioners during surgical procedures. Obviously the dilemma of continuing or interrupting blood thinners before dental procedures is quite valid for the dentists.

In the present survey, almost 60% of participants stated that they usually follow the directives of cardiology consultants in patients using blood thinners. Although this option seems to be the ideal way to manage those medications perioperatively, the consultant suggestions may not be in concordance with actual guidelines, they may be misunderstood or stay below the radar of the participants as well. On the other side 35% of the dentists performed tooth extractions without interrupting their routine medications. Because those are vital for thromboembolic prophylaxis and dental procedures itself are considered as having minor bleeding risk, this approach

is also rational and acceptable. Although encompassing a minor proportion of the studied population discontinuing those medications by the dentists themselves may give rise to fatal consequences. This finding emphasizes the necessity of enhancing the core education curriculum for dentists, highlighting the importance of including comprehensive and up-to-date knowledge about thromboembolic conditions, the assessment and management of bleeding risk, the pharmacological effects and clinical handling of blood thinners, as well as detailed guidance on hemostatic techniques.

Perioperative management of patients using antiplatelet agents who undergo non-cardiac surgery is a common clinical problem. Following coronary stent implantation the incidence of non-cardiac surgical procedures is found to be 7% at 1st year, 18% at 2nd years and 22% at 3rd years [7]. Premature discontinuation of blood thinners in those patients increased the risk of perioperative acute coronary syndromes due to stent thrombosis associated with high morbidity and mortality rates. Particularly in the first year following stent implantation, the risk of major adverse cardiac events increases 3- to 5-fold when medications are interrupted [8]. Several reports have demonstrated that perioperative gap of antiplatelet agents is responsible for approximately %10 of new acute cardiovascular syndromes in patients with coronary stents [9].

In recent years, almost all stents implanted during percutaneous coronary interventions are drug-eluting. By introducing drug-eluting stents, it was aimed to inhibit endothelial smooth muscle cell proliferation and thus preventing restenosis previously seen with bare metal stents. While minimizing restenosis, accumulation of activated platelets over the denuded stent struts exposes the risk of stent thrombosis until the completion of reendothelization of the coronary artery wall. Although the rate of endothelization is said to be faster with newer generation drug-eluting stents, exact timing of complete endothelial coating still remains obscure [10]. Thus, aiming to prevent stent thrombosis and securing the patency of the rest of the presumably narrowed coronary arteries those patients should use antiplatelets almost lifelong. It is a common practice in most circumstances is to order dual antiplatelet therapy (aspirin + clopidogrel most frequently) for the first year following the stent placement and subsequently continue with a single agent for the whole lifetime [11, 12]. And any attempts to stop or interrupt those agents will provide a hazardous period which may end up with mortal complications.

On the other side, recent studies literature showed that there is no difference between perioperative continuation or interruption of aspirin in terms of major bleeding [12]. The only indications may be those in which even minor hemorrhagic collections may cause loss of function, organ or life such as brain, spinal cord and eye's posterior chamber operations. Although still being debatable, it's shown that major operations like orthopedic, lung, liver and prostate surgeries can be performed without interrupting antiplatelets when necessary [13].

In a survey, 28.7% and 25.9% of the participants indicated postoperative and intraoperative bleeding respectively as the most concerning [14]. A similar conclusion was made about the overestimation of the risk of bleeding by the dentists [15]. Major bleeding can lead to inconvenient circumstances in certain procedures however, in various dental society guidelines, it was stated that all dental procedures do not possess high bleeding risk and vast majority of them have minor bleeding risk so that none of those vital antiplatelet regimens should not be interrupted [16].

In our study group almost 70% responded that they performed dental procedures without interrupting antiplatelet therapy. On the other side 30% dentists remove the antiplatelet protection prior to the dental interventions.This data emphasize that relevant societies must provide educational programmes and guidelines indicating the importance of those medications in certain patient groups and the balance between bleeding and thrombotic risks.

Bridging blood thinners means to replace current medication with another one with the same mechanism of action and effects but having faster elimination rates. This technique enables maintenance of protection and preservation of hemostatic mechanisms as well if the morning dose is skipped. The key point here is the "similar effect", but antiplatelets are quite often bridged with anticoagulant agents nowadays namely with LMWH. It has been shown that LMWH can't ensure the same protection as antiplatelets, whereas heparin itself may even be harmful. In the literature there were several case reports of perioperative stent thrombosis in patients whose antiplatelets were bridged with heparin derivates [6]. However, this method of bridging are still suggested by cardiology consultants as stated by one fifth of the participants. This misjudgement is related with being unaware of operative conditions and bleeding risks and instead of maintaining actual antiplatelet medications, it is bridged with LMWH in a desperate effort. In a study, comparing continuation of antiplatelets with LMWH bridging demonstrated an increased incidence of stent thrombosis and also higher bleeding rates with LMWH [17].

There may be options of "true bridging" in which intravenous antiplatelet agents are used in cases with both high bleeding and thrombotic risk. However, this regimen needs a period of hospitalization preoperatively and may not be cost effective.

Warfarin is the gold standard in patients with high thromboembolic risk [18]. So, it is not feasible to interrupt warfarin for any period of time. It seems that

continuing or bridging warfarin are the only options for those patients. Bridging warfarin and DOACs with agents having same mechanism of action such as LMWH is rationale and frequently used. If the bleeding risk of the procedure is high or INR level is higher than allowed levels, warfarin therapy should be stopped 3 to 5 day prior to operation and LMWH be started when INR levels reach to 2. As expected, almost half of our study population stated that bridging warfarin with LMWH is suggested by the consultants.

One fourth of the participants performed all dental procedures without any interruption if bleeding risk is low and if INR is below 4 [19]. Most studies recommend continuing anticoagulant therapy without any modification in the perioperative settings for dental interventions. If INR level obtained within 24 h prior to the intervention is below 4, most dental surgeries could be performed in patients using warfarin therapy. A study showed that there is no significant difference in terms of bleeding between continuing warfarin therapy prior to minor dental procedures (9.1%) and bridging with LMWH (8.1%) [20].

In the last decades, direct oral anticoagulants have been introduced as alternatives to warfarin. DOACs demonstrate a more predictable response, minimal interactions with drugs and food and better adherence to therapy. INR which monitors warfarin effect, have not been used for DOACs [3, 21]. Because those agents are rather new, they have not been studied for application in high thromboembolic risks. Most people use them for thromboembolic prophylaxis in atrial fibrillation. This means that DOACs can be stopped for few days before procedures with high bleeding risk, continued or bridged with LMWH rarely in certain conditions [22, 23].The decision should be based on the thromboembolic and bleeding risks [24].

This study has several limitations that should be considered. First, the responses may have been influenced by regional practice patterns, institutional protocols, and differences in educational background across participants. These factors may limit the generalizability of the findings. Second, the survey was self-reported and distributed online, which introduces potential biases such as recall bias and social desirability bias.

It's understood that our participants are rather less familiar with those group of agents and consultants suggestions are also scattered. One fourth proposed to operate without stopping DOACs, 16% discontinued and 12% bridged with LMWH. European Heart Rhythm Association guidelines suggest that elective surgical interventions can be performed without any interruption of DOACs if bleeding risk is not high [25]. Otherwise, DOACs can be stopped 24 or 48 hours prior to the interventions and subsequently resumed after 12 hours if hemostasis can be achieved properly [26]. Another option is just to skip the morning dose of the DOAC and to start regular drug intake in the evening after hemostasis achieved [24]. Current evidence on the management of direct oral anticoagulant' users is based upon non-dental data, case reports and expert opinions. Numerous national guidelines and comprehensive reviews along with clinical experience advocate for performing all dental procedures without discontinuing DOACs [2].

It's understood that a considerable number of participants are not familiar with the blood thinners, coagulation tests and perioperative management. The survey showed that all Turkish participants accept the necessity to develop an exclusive dental practice guideline for managing patients using blood thinners. There is an urgent need for all dentists and medical consultants to update themselves on perioperative management of blood thinners in dental patients.

Clinical relevance

There is a necessity to constitute an exclusive dental practice guideline in Turkey for managing patients using blood thinners. Dental practitioners must stay up-to-date with all scientific knowledge involving their profession to perform best practice.

Abbreviations

LMWH	Low molecular weight heparin
INR	International normalized ratio
DOAC	Direct acting oral anticoagulant

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12903-025-05980-w.

Supplementary Material 1

Acknowledgements

We would like to extend our gratitude to Turkish Dental Association who convey the survey to the Turkish dentistry community and to the respondents who took time to fill out the survey. There is no funding support.

Author contributions

OD: Conception, Design, Analysis and/or Interpretation and WritingSG: Data Collection and/or Processing, Literature ReviewAA: Data Collection and/or Processing, Analysis and/or Interpretation *All authors reviewed the manuscript.

Funding

There was no financial support.

Data availability

The datasets generated and/or analysed during the current study are not publicly available due [Since participants' data contain personal and sensitive information, they cannot be publicly disclosed in accordance with privacy protection and ethical guidelines. but are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
Bezmialem Vakif University Ethics Committee approved the study in accordance with the Declaration of Helsinki (Decision no. 14/280). Informed consent to participate was obtained from all of the participants in the study.

Consent for publication
Not applicable (This study did not involve any identifiable individual data, images, or videos).

Competing interests
The authors declare no competing interests.

Received: 20 February 2025 / Accepted: 9 April 2025
Published online: 20 April 2025

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