

REVIEW ARTICLE

[Translated article] International Consensus Meeting on Venous Thromboembolism (ICM-VTE) after orthopedic procedures, any change in our clinical practice?



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Abstract The International Consensus on Venous Thromboembolism (ICM-VTE), will change our current practice as most recent evidence is included. This fact is not usual in most clinical practice guidelines to date.

Many orthopedic and trauma procedures do not require thromboembolic prophylaxis, but it should be considered depending on individual risk factors or major surgeries (total hip or knee arthroplasty, spine surgery or fractures that require immobilization and weight bearing restriction).

Within the prophylaxis options, we must notice the strength of the drug preventing venous thromboembolism, but also the effect of hemorrhage and bleeding that it may produce. The use of aspirin and mechanical prophylaxis has been described as the safest and most effective combination in most cases.

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PALABRAS CLAVE

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Traumatología

Consenso Internacional sobre Tromboembolismo Venoso (ICM-VTE) en COT, ¿cambiará en algo nuestra práctica clínica?

Resumen Las aportaciones del Consenso Internacional sobre Tromboembolismo Venoso (ICM-VTE) modificarán nuestra práctica diaria recogiendo la evidencia actual que no aparece en la mayoría de las guías de práctica clínica hasta la fecha.

Muchos de nuestros procedimientos de Cirugía Ortopédica y Traumatología (COT) no requieren de una profilaxis tromboembólica que solo se administra cuando existan factores de riesgos

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individuales o cirugías mayores (artroplastia total de miembros inferiores, cirugía de columna o fracturas que requieran inmovilización y limitación en la carga precoz).

Dentro de las opciones de profilaxis se debe tener en cuenta la potencia del fármaco para prevenir el tromboembolismo venoso, pero también el efecto de hemorragia y sangrado que pueda producir. El uso de aspirina y medidas mecánicas se establece como la combinación más segura y eficaz en muchos de los casos.

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Introduction

As orthopaedic surgeons and traumatologists, we have all experienced the questions that arise in relation to venous thromboembolism (VTE) in our patients. Although it occurs rarely, its clinical and medico-legal consequences are significant. It is surprising that most of the literature in this field is based on studies with little scientific evidence, with little applicability to clinical practice in Orthopaedic Surgery and Traumatology (OST) or with clear conflicts of interest in their development. If we look at international guidelines, most of them have not been updated in the last 8–10 years, the most updated being the British NICE guideline with a revision in 2018,¹ while our society's guideline was last revised in 2007.

Material and method

The International Consensus Group (ICM) recently raised the possibility of joint work to try to shed some light on these uncertainties.² Invitations were sent out to potential participants, following the criteria of being the author of three or more publications in this field or being a representative of one of the scientific societies affected by venous thromboembolism within Orthopaedic Surgery and Traumatology. In the end, 570 doctors from 115 different countries participated, representing 135 scientific societies from all over the world. Against this backdrop, it is highly remarkable how Spain is among the four most represented countries by number of delegates. After an evaluation of the questions submitted, 200 questions were selected covering most of the specialties of Orthopaedic Surgery and Traumatology, as well as an initial section of generalities. Following the Delphi method, the content of each question was adjusted. Each question was assigned to at least two delegates based on their experience in the field or special interest. A systematic literature review was conducted with support from the Thomas Jefferson University Library and the Cochrane Group. Overall, more than 200,000 publications were reviewed, with publications primarily from the last 15 years. A draft of all questions was presented to the delegates and possible modifications were made. Subsequently, each question was peer-reviewed and reviewed by the editors of each section. During September and October, all 200 questions were voted on by all delegates. Finally, the last phase has been the dissemination of the information and in March 2022 the consensus was published in full in the American Journal of Bone & Joint Surgery.² The

translation into different languages is underway and the Spanish version has recently been published on the SECOT website and is available to all of you free of charge.

Results

Throughout this article we will summarily highlight some aspects of the consensus that may affect our daily clinical practice. From an academic point of view, we will divide it into the different sections presented in the consensus.

Generalities

Although the general aspects in patients that affect the orthopaedic surgeon and traumatologist are difficult to standardise, there are some aspects that are common to the different interventions of OST. The following is an attempt to summarise some aspects that could be of interest to any OST regardless of specialisation.³

Starting with the risk factors for VTE, we can say that there are some comorbidities that increase the risk of suffering this complication such as hypoalbuminaemia, inflammatory disease, non-optimal body mass index (BMI), active adenocarcinoma, haematological malignancies, blood dyscrasias, chronic renal failure or the presence of HIV.

Although more risk factors could be added or those presented here could be qualified, the consensus establishes reasonable grounds for increased chemoprophylaxis in patients with high BMI. There is also an increased risk of bleeding and wound complications in these patients and aggressive chemoprophylaxis would also increase the rate of these other complications.⁴

External factors to the patient that may increase risk are also present, such as travelling by plane or car for a long period of time after orthopaedic surgery. The consensus in this regard recommends avoiding such travel in the first few weeks after surgery. However, it is not the same if the patient has undergone hip or knee arthroplasty (higher risk) as an upper limb operation. If the patient has to travel in the first six weeks after hip or knee arthroplasty, it is advisable to use a more potent agent for VTE prophylaxis. This is thus another important aspect when assessing the risk in our patients – that not all interventions carry the same risk and together with the aforementioned hip and knee arthroplasties, hip fracture fixation is associated with a greater

increase in the risk of VTE. There is also agreement in the literature on the association of blood transfusion after surgery and an increased risk of venous thromboembolism. This risk does not seem to be associated with the use of tranexamic acid and should therefore not be considered a risk factor.

Some consensus questions assess the need to stratify the risk of venous thromboembolism in order to choose the most appropriate prophylactic treatment. Most of these stratifications are not validated and therefore their use is of relative importance so that in the end it is often useful to divide into high or low risk patients in order to use a more or less aggressive prophylaxis. Although this controversy exists for venous thromboembolism, there are not many publications assessing the risk of haemorrhage and bleeding from the use of this chemical prophylaxis. The consensus recommends that any potential benefit in terms of reduced risk of VTE should be weighed against a possible increased risk of bleeding.

Analysing the behaviour of pulmonary embolism in OST, it occurs during the four weeks after the intervention. The consensus recognises that deep vein thrombosis can lead to pulmonary embolism, but in patients undergoing orthopaedic surgery and especially total joint arthroplasty, there is no relationship between deep vein thrombosis and the development of pulmonary embolism. Given this assertion, the question arises as to how to manage deep vein thrombosis in the context of a patient undergoing total joint arthroplasty. In the case of distal deep vein thrombosis, the recommendation is to monitor the clinical evolution of the patient and not to perform specific treatment or to treat with aspirin. However, in the case of popliteal or suprapopliteal deep vein thrombosis, the recommendation is for early pharmacological treatment.

Regarding the field of venous thromboembolism prophylaxis after orthopaedic or trauma surgery, there are a number of consensus conclusions based on recent evidence that may change the current paradigm in this area. To the question, Is the administration of any venous thromboembolism (VTE) prophylaxis effective in reducing the risk of death from pulmonary embolism (PE), the consensus concludes that there is no evidence that the use of thromboembolism prophylaxis decreases the risk of fatal pulmonary embolism in elective orthopaedic surgery, including hip and knee arthroplasty.^{3,5}

Another question in the consensus refers to the duration of this prophylaxis in a generic way and concludes that after major surgery this prophylaxis should be maintained for 14–35 days after the intervention. In terms of cost-effectiveness, the consensus determines that the most cost-effective venous thromboembolism prophylaxis is the use of aspirin versus other chemical prophylaxis options. In general, it is recommended that the choice of type and dose of chemical prophylaxis should be made on an individualised basis taking into account all the individualised risk factors affecting that patient.

Although most of the controversy is associated with the choice of one or the other type of drug as prophylaxis, mechanical measures have gained importance in recent publications. One fact is the early ambulation of our patients after orthopaedic surgery. Patients nowadays perform early ambulation and this is a very important factor in reducing the risk of venous thromboembolism. Other mechanical

measures such as lower limb compression systems have proven to be effective in prevention, along with the use of chemical prophylaxis. Intermittent lower limb compression devices, such as plantar compression pumps or lower limb elastic stockings, are associated with this positive mechanical effect in reducing venous thromboembolism.^{6,7}

If we look into the prophylactic treatment of venous thromboembolism, we see that aspirin is one of the drugs that has emerged strongly in recent publications. Low doses of aspirin (81 mg twice daily) seem to be shown to have the same effect as higher doses for the prevention of venous thromboembolism after orthopaedic surgery. This dosage decreases side effects while maintaining its effectiveness.^{8–11} If we are going to use other anti-inflammatory drugs in the postoperative treatment of these patients, we should keep in mind that aspirin should be taken 2 h before any other anti-inflammatory drugs we are using in order to maintain their action. In the case of using other anti-inflammatory drugs, the use of Cox-2 may be more compatible when using aspirin as prophylaxis.

When assessing the best time for initiation of chemical prophylaxis, recent studies recommend that no pre-operative administration should be given prior to elective surgery and that the first postoperative dose should be given at least beyond 12–24 h after surgery. This will reduce the complications of pre-operative bleeding and haemorrhage.

All these recommendations are of a general nature and should be individualised according to the risk factors of each patient and the type of intervention to be performed. In this regard, the adjustment of the dose of LMWH according to weight has been much discussed due to the increase in bleeding at these doses.

The consensus recommends weight adjustment of LMWH dose only in cases of very extreme BMI ranges. In the situation of persistent wound drainage with extensive haematoma in the early postoperative period, it is recommended to switch prophylaxis to a less aggressive chemical agent, in this case to aspirin.^{12,13}

Hip and knee

One of the most widely published areas of venous thromboembolic disease is elective hip and knee arthroplasty.¹⁴

We must be clear that, despite the decrease in the incidence of venous thromboembolism after hip and knee arthroplasty with the use of prophylactic medication, this complication will continue to be present despite improvements with these types of treatment. Consequently, it is very important to establish a balance between the antithrombotic potency of these medications and their side effects in the form of bleeding and haemorrhage.^{15–19}

The risk is also different between total hip and total knee arthroplasty, with total knee arthroplasty being associated with a higher risk of venous thromboembolic disease. If we focus on the optimal prophylaxis, the consensus is that the safest and most effective method is the use of low-dose aspirin, including high-risk patients. This statement is supported by a meta-analysis of prospective randomised studies confirming the efficacy of aspirin use in reducing thromboembolic complications after hip and knee arthroplasty. In addition, a reduction in bleeding, haematomas

and prosthetic infections is observed with the use of aspirin compared to other more potent prophylactic drugs. Low-dose aspirin, in the range of 75–100 mg twice daily, has been shown to be the safest and most effective option in the prophylaxis of venous thromboembolic disease after total hip and knee arthroplasty.^{12,20}

Complications related to the potency of drugs for VTE prophylaxis have been highly evaluated during different consensus questions because of the risk of perioperative bleeding and haemorrhage. This aspect is often underappreciated in less recent publications, but is now being placed on the same level of importance as deep vein thrombosis. In this respect, the safest drug is aspirin followed by low molecular weight heparin and finally the potent oral anti-coagulants. Within the latter group, the safest according to recent publications appears to be Apixaban. The use of warfarin for this prophylaxis deserves special mention, as it is the drug most associated with bleeding, surgical site infections, reoperations and readmissions in the immediate postoperative period in patients undergoing total hip and knee arthroplasty.¹⁴

While we have discussed chemical prophylaxis in these patients undergoing total hip and knee arthroplasty, a fundamental role in combination with this prophylaxis is the use of mechanical measures. Without realising it, in our daily practice we have been varying the use of these mechanical measures with the inclusion in our protocols of improvements such as early ambulation of our patients after these interventions. The consensus recommends early ambulation as a very important mechanical measure in combination with chemical prophylaxis. Intermittent lower limb compression systems after these interventions have been associated with lower rates of venous thromboembolism. The use of these mechanical devices in combination with chemical prophylaxis seems to be recommended, especially with the use of aspirin. There is some debate as to the duration of use of these mechanical devices, as well as their non-adherence in the immediate postoperative period due to patient discomfort. There are many types of mechanical devices, but intermittent compression, plantar compression systems or compression stockings have been shown to decrease the rates of venous thromboembolic disease associated with clinical prophylaxis. It seems that at least during the admission of patients to hospital these systems should be used and maintained for a minimum of 10–14 more days.²¹

Foot and ankle

In the section on the foot and ankle, the consensus makes clear distinctions for the indication of thromboembolic prophylaxis and between the types of surgery performed in this anatomical area, as well as the need or not for offloading of the operated limb.²² Although there are no high evidence studies in this field, there are certain surgeries that seem to increase the risk of venous thromboembolism, such as Achilles tendon repair surgery. In general, we should assess more generic risk factors of the patient rather than the type of surgery.

A higher rate of venous thromboembolism appears to be associated with being over the age of 50 years, immobilisation in a splint or cast, Charlson comorbidity index

greater than 2, varicose veins, history of VTE, hypercoagulability disorder and inflammatory arthritis. Perhaps the most important factor in these surgeries may be weight-bearing restriction, in particular it is considered to be a higher risk if more than 50% of weight bearing is prevented. Taking these parameters into account, prophylaxis is not required in low-risk patients undergoing forefoot or midfoot surgery, especially if weightbearing is allowed. In the same vein, prophylaxis would also not be recommended in low-risk patients undergoing Achilles tendon repair and ankle or hindfoot arthrodesis. The case of patients undergoing total ankle arthroplasty is more controversial; in these patients a risk–benefit balance of the use of prophylaxis must be established based on the patient’s individual risk factors and immobilisation.

Hand and wrist

In the case of hand and wrist surgeries, there are also some special characteristics of this anatomical area that could vary the risk of thromboembolic disease. Thus, surgeries lasting longer than 90 min, surgeries involving reimplantation or transfer of vascularised free flaps may be high risk.²³ In all other hand and wrist surgeries, the use of prophylaxis is not routinely recommended, although in high-risk cases the use of chemical prophylaxis should be considered. These statements can be extended to finger surgery where prophylaxis is generally not necessary and its use should be considered only in cases of finger reimplantation, microsurgical techniques or those requiring more than 90 min of surgery.

Tumour surgery

In the field of tumour surgery in our speciality, most patients undergo major tumour reconstructions, pathological fracture fixation, surgeries involving offloading, as well as long-term surgeries. Therefore, they are susceptible to thromboembolic prophylaxis in the vast majority of cases. The type of prophylaxis and the duration of prophylaxis should be individualised in each case in relation to discharge periods and individual patient factors. Only in cases where the risk of bleeding is high due to patient characteristics, the use of aspirin and mechanical measures may be a valid alternative. In general the tendency is to use high potency chemical prophylaxis.²⁴

Paediatric orthopaedics

In general, the use of chemical thromboprophylaxis after orthopaedic or trauma surgery is not necessary in the paediatric population. However, there are a series of individual conditioning factors that could vary this assertion. The adolescent period (13 years and older) is one of the most important determinants because it may be associated with other factors that increase risk, such as central venous catheter placement, obesity, severe trauma, oral contraceptive use, familial thrombophilia or major surgeries (infections, spine, hip or sports medicine).²⁵ In children, the presence of neuromuscular disease or lower extremity cast immobilisation are not factors that in themselves require chemical prophylaxis. Notwithstanding, especially in adolescents with more aggressive orthopaedic or traumatic surgeries, associated

risk factors such as prolonged immobilisation often appear, which force us to assess the need for this prophylaxis.²⁵

Shoulder and elbow

In the area of shoulder and elbow surgery, there appears to be an increased risk of thromboembolic disease in cases of fractures, mainly in surgeries lasting more than 90 min or associated with other individual patient risk factors. In general, more frequent shoulder and elbow surgeries such as arthroscopy or elective arthroplasty are not usually considered to be high risk.²⁶ A debated issue in the literature is the need for this prophylaxis when upper limb immobilisation is performed. There is no data to support the use of prophylaxis when there is only immobilisation of the upper limb; however, it is often associated with other individual patient risk factors and the need for prophylaxis should always be assessed on a case-by-case basis. Due to the low rates of venous thromboembolism in patients undergoing prosthetic shoulder surgery, the use of prophylaxis does not seem to be appropriate, but aspirin could be used in those cases where it is necessary. This decision should be made on the basis of the bleeding risks of other prophylactic drugs versus the individualised risk benefit of venous thromboembolism. Although we have mentioned the absence of risk in shoulder arthroscopy, in cases where stabilisation surgery is performed with the Latarjet/Bristow procedure, the need for chemical prophylaxis should be assessed on an individual basis.²⁶

Sports medicine

In the sports medicine section, we are going to refer to the most frequent surgeries performed on sports patients. Broadly speaking, the use of prophylaxis is not necessary in upper limb surgery, while in lower limb surgery it is necessary to assess the limitation of ambulation and load, as well as individual risk factors.²⁷ In the case of knee arthroscopy, chemical prophylaxis should only be considered when prolonged offloading is indicated or individual risk factors exist. In the case of hip arthroscopy or mini-anterior approach, prophylaxis should only be administered in patients with higher individual risk or prolonged offloading, and in these cases the use of mechanical measures associated with low-dose aspirin may be an alternative.²⁷

Spine

In contrast to upper limb surgery, spine surgeries can in most cases be considered high-risk. In general, oncological procedures, infections, fractures, multilevel fusions and combined approaches with anterior approach are considered high risk.²⁸ Associated with the above processes, any spinal surgery requiring admission to the intensive care unit should be considered high risk for venous thromboembolic prophylaxis purposes.

On the other hand, spinal surgery performed on paediatric patients is considered low risk as long as they are under 13 years of age. However, we must never forget to assess the individual factors of each patient for the final decision.

Dural tear is a complication that can occur after spinal surgery and behaves as a risk factor requiring potent thromboembolic prophylaxis. If we decide to use chemoprophylaxis for venous thromboembolism, this treatment should be initiated 24–48 h after surgery and we should always consider possible haemorrhage or bleeding when deciding on the type of drug to use.²⁸

Trauma

The great variability in the field of fracture surgery makes it difficult to establish single patterns of venous thromboembolism management. Minor surgeries are considered to be those involving the management of fractures of the upper extremity, as well as fractures distal to the ankle. The rest of the fractures present a higher risk and it increases progressively as these fractures occur more proximally.²⁹

A highly frequent issue in our daily practice is the prophylaxis procedure when we encounter a fracture in which we perform conservative treatment. As a common pattern, in a single fracture of the lower extremity not requiring surgical intervention, venous thromboembolism prophylaxis would not be indicated. Even in the case of prolonged immobilisation, there are some societies that continue to recommend against the use of thromboembolic prophylaxis.^{1,30} Contrary to these recommendations, most European societies' guidelines state in one way or another the use of prophylaxis in these cases, although the choice of one or another type of prophylactic drug is not influenced by the duration of lower limb immobilisation.³¹

Fragility fractures in the elderly is a very important part of our daily practice. Patients with pelvic or lower extremity fragility fractures must be approached taking into account the individual risk factors that these patients present, regardless of whether treatment is to be conservative or surgical. In most cases, we must establish thromboembolic prophylaxis taking into account the benefit–risk balance of this prophylaxis versus the occurrence of haemorrhage and bleeding which can be very harmful in this type of patient. In these patients, early mobilisation and weight-bearing ambulation play a crucial role in reducing venous thromboembolism.

In hip fractures not treated surgically, prophylaxis should be established with any of the drugs currently available, as this will often imply a delay in ambulation. In the case of hip fractures treated by osteosynthesis, it is recommended that prophylaxis be started 12 h after surgery and continued for at least 28 days. If surgery is delayed, preoperative prophylaxis should be initiated until the operation is performed. Despite the many clinical practice guidelines for this pathology, there is no clear consensus on the drug to be used and its duration over time.³² In the case of total arthroplasty or hemiarthroplasty after hip fracture, it is recommended that chemoprophylaxis be carried out with any of the alternatives available to us, including the use of aspirin.

Some of the interventions we usually perform do not require thromboembolic prophylaxis, such as the removal of osteosynthesis material in the upper or lower limb or in the case of isolated patella fractures treated surgically or conservatively.

Conclusion

The contributions of the International Consensus on Venous Thromboembolism (ICM-VTE) will modify our daily practice, gathering the current evidence that does not appear in most clinical practice guidelines to date.

Many of our Orthopaedic Surgery and Traumatology procedures do not require thromboembolic prophylaxis, which is only administered when there are individual risk factors or major surgeries (total lower limb arthroplasty, spine surgery or fractures requiring immobilisation and early load limitation).

Among the prophylaxis options, we must take into account the potency of the drug to prevent venous thromboembolism, but also the effect of haemorrhage and bleeding that it may produce. The use of aspirin and mechanical measures is established as the safest and most effective combination in many cases.

Level of evidence

Level of evidence III.

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Conflict of interest

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